

# **GLOBAL VILLAGE ENERGY PARTNERSHIP (GVEP) SUPPORT TO SRI LANKA AND ZAMBIA FINAL REPORT**



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GVEP Action Plan Development for Sri Lanka & Zambia**

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**Nexant**

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## I. Introduction

The Global Village Energy Partnership Program (GVEP) was announced as one of 14 Presidential Initiatives announced at the Sustainable Development Summit in Johannesburg, South Africa in August 2003. The GVEP Program seeks to reduce poverty and enhance sustainable development through the accelerated provision of modern energy services to those unserved or underserved. This is made possible through a partnership of developing and industrialized country governments, international development agencies, donor organizations, private firms, consumers, NGOs and others committed to addressing energy-poverty. This document sets forth a Statement of Principles for partners to the Global Village Energy Partnership, including responsibilities, services and proposed activities.

**Letter to H.E. Martin Brennan  
U.S.A. Ambassador in Zambia**

*"... Based on outstanding support from USAID [through CORE International, Inc.], we have made considerable progress on all fronts in advancing our energy sector agenda. In November 2003, Cabinet approved my Ministry's proposal for the establishment of a Rural Electrification Authority (REA); we have a functioning multi-sector Rural Electrification Working Group (REWG) that has been advising us on next steps for enhancing rural energy access in the country; we have had two workshops on the GVEP initiative facilitated by CORE International and are in the process of formalizing the establishment of a GVEP Working Group; and we have begun the process of revising our National Energy Policy to incorporate new developments since 1994 when the policy was enacted. We give USAID the credit for assisting us achieve milestones that have developed a strong momentum, which we now want to maintain."*

**H.E. George W. Mpombo, M.P., Minister  
Ministry of Energy and Water Development, Zambia  
April 28, 2004**

Both Sri Lanka and Zambia are one of the first nations that joined GVEP at the World Summit on Sustainable Development held in Johannesburg, South Africa in August 2003. USAID has been supporting the GVEP activities in both countries since 2003.

**Sri Lanka:** To move forward with its participation in GVEP, the Government of Sri Lanka has designated the Ministry of Power and Energy as its lead ministry for coordinating development of its initial rural development program under GVEP. In November, 2003 CORE International, Inc. initiated provision of assistance to the

Ministry of Power and Energy to facilitate near-term actions to enhance Sri Lanka's process of active participation in GVEP. This assistance included: (i) conducting a review and assessment of the current rural electrification (RE) and rural energy services (RES) setting and the role of various entities and institutions in adapting a multi-sector approach to rural development; (ii) initiating in-country consultation among all major RE/RES stakeholders at the national level, and assisting with the establishment of a multi-sector Rural Electrification Working Group as an initial stakeholder body to be eventually formalized as the GVEP Working Group; and (iii) providing assistance in the development of an initial action plan for enhancing its participation in the GVEP movement.

Support to the Ministry of Power and Energy in Sri Lanka was initiated on October 30, 2003 through an initial strategy meeting with the Secretary of Power and Energy. Specific areas of activities included the following:



- Selection of the most appropriate rural development areas to be included in Sri Lanka's initial GVEP action plan.
- The composition and formation of the GVEP Sri Lanka Working Group to recommend to GOSL areas for selection.
- The importance of combining rural energy development in a truly multi-sector approach to rural poverty alleviation involving such non-energy sectors as the health, education, agriculture, transport, and enterprise sectors.
- The need to find appropriate and complementary ways to integrate new GVEP action plan components with the many ongoing rural energy development projects in Sri Lanka, particularly those of the World Bank and the Asian Development Bank.
- The need to develop a sound, efficient management structure for implementing the initial GVEP action plan and to estimate the management resources required.
- Defining the potential scale and required level-of-effort of Sri Lanka's participation in GVEP.

**Zambia:** The USAID sponsored work with the Zambian stakeholders in the context of the GVEP initiative began in May 2003 under another USAID intervention – Support to the Rural Electrification Working Group (REWG) in Zambia. Since then, substantial progress has been made by the REWG and the Department of Energy (DOE), namely: (i) the REWG itself was established, (ii) a mid-term action plan for rural electrification and rural energy services was drafted, (iii) a report with rural energy policy and institutional issues, options, and recommendations was submitted to the Government of the Republic of Zambia (GRZ), (iv) the concept of an apex institution for rural electrification and other rural energy services was developed and presented to the GRZ, (v) a GVEP Secretariat was established and located within the DOE, (vi) a proposal for support in the framework of the GVEP was submitted to the GVEP Technical Secretariat

**Letter to Mr. Gordon Weynand  
Energy Team Leader, EIT/EGAT Bureau, USAID**

*"... I write to report to you about the positive assistance that we are receiving from USAID the programs that we are pursuing. With the assistance of funds provided by USAID [through the Private Sector Development Task Order] and the facilitation of CORE International we have been able to among other things, achieve/get useful inputs in the following:*

- *Identified critical issues in our rural electrification program and how to address these issues*
- *Designed a framework for establishing a Rural Electrification Authority (REA) whose legal framework was adopted by our Parliament in November, 2003*
- *Set in motion a wider consultative process for reviewing our National Energy Policy which we adopted in 1994*
- *Gathered and got on board the support of many local stakeholders for the Zambian Component of the Global Energy Partnership*
- *Preparation of the Increased Access to Energy Services Project on which we are collaborating with the World Bank.*

*The purpose of writing this letter is to alert you of our need for further USAID support in completing the activities we have commenced. We are thinking of putting together a request for support covering the next 3 years. Should this be acceptable to USAID, we propose to continue working with CORE International, which has so far proved very effective in providing this support to us.*

*Yours Sincerely,"*

**Oscar Kalumiana  
Acting Director  
Department of Energy  
Ministry of Energy and Water Development  
Zambia  
March 31, 2004**



in Washington D.C., and (vii) a solicitation for identifying other interested stakeholders in the GVEP-Zambia to-be-established Working Group was made public by the DOE on behalf of the GRZ.

USAID also provided assistance to Zambia to support and facilitate the transition of the REWG to the Zambian GVEP National Working Group. Specific assistance to Zambia included the following:

- A review of the completed actions and identification of necessary activities for 2004, regarding Zambia's enhanced participation in the GVEP.
- Facilitation of a GVEP Working Group one-day workshop and the formation of the Zambian GVEP Working Group, and potentially focusing on issues related to the role of this institution in the process of preparation of the new loan from the World Bank in the area of rural energy service delivery.
- Furthering the finalization of a draft rural electrification policy for Zambia in the context of the upcoming Zambia's Growth and Poverty Reduction Strategy.
- Assisting the Minister in appointing a Task Force to revisit Zambia's 10 year old National Energy Policy and making recommendations for policy reform with a specific focus on rural energy provision to Zambia's rural poor.

## II. Objectives

In September of 2004, USAID's assistance, to further Sri Lanka's and Zambia's participation in the GVEP Initiative was again requested through a subcontract between Core International and Nexant under the USAID Contract LAG-I-02-98-00006-00 Work Order 193 GVEP Action Plan Development for Sri Lanka and Zambia. The primary objective of this Work Order was to maintain the momentum that the two countries had developed in their progress with the GVEP program with continued assistance from USAID. The focus of this Work Order was to provide support to the GVEP Working Groups in Sri Lanka and Zambia, both of which are in need of considerable technical assistance and capacity building during the start-up phase as well as during the developmental phase in order to achieve the requisite level of sustainability. In addition, the Work Order was to initiate the development of national GVEP Action Plans and coordination with donors and private investors, a fundamental initial mission of the Secretariats and the GVEP Working

**Letter to Ms. Jacqueline E. Schafer  
Deputy Assistant Administrator, EGAT Bureau, USAID**

*"I wish to acknowledge with thanks receipt of the Report on Energy Services Delivery in Zambia: Status and Opportunities for Enhancement in the Context of GVEP.*

*Kindly be informed that I am very impressed with the effort and assistance that the USAID had rendered to ensure that this important report is produced at a time when my Ministry is scaling up efforts to enhance energy delivery systems for the majority of the Zambians. I have been informed that my officials had fruitful interaction with the Consultants, CORE International, Inc. whose input to this process has been very rewarding.*

*I finally wish to inform you that the strategies that have been recommended and action plan developed will receive full support of my office."*

*Yours Sincerely,"*

**George W. Mpobmo  
Minister  
Ministry of Energy and Water Development (MEWD)  
Zambia  
July 28, 2004**

Groups in both countries. A key aspect of the GVEP Action Plan preparation is their integration with the countries' Poverty Reduction Strategy Paper (PRSP).

Specific proposed activities in Sri Lanka and Zambia varied because of (i) differences in some GVEP planning requirements, (ii) existing levels of planning information, and (iii) local professional resources available to support the GVEP facilitation. Progress under each of the Tasks defined below is discussed in further detail throughout this report:

**Sri Lanka:**

- Task 1: Support to the GVEP Working Group and Secretariat
- Task 2: Sri Lanka Multi-Stakeholders Technical Meeting
- Task 3: Support for a Public Participation and Public Awareness Strategy

**Zambia:**

- Task 1: Support to the GVEP Working Group and Secretariat
- Task 2: GVEP Policy Goals Definition
- Task 3: Renewable Resources Assessment Design
- Task 4: Electricity-Water Nexus and its Implications for GVEP
- Task 5: GVEP and the Rural Electrification Master Plan
- Task 6: Public Awareness Program Design

### **III. Global Village Energy Partnership (GVEP) Initiative in Sri Lanka**

#### **A. Background**

Nearly 90% of the poor in Sri Lanka reside in rural areas in the South and on tea and rubber estates in the Central region. Between 25% and 39% of the population can be classified as poor, depending on which of the various benchmarks of poverty are accepted. Commercial energy availability and consumption in Sri Lanka's rural regions are at levels associated with subsistence or otherwise low-productivity agriculture. This lack of available energy is a limiting factor for increased agricultural productivity and improved rural living standards. Agriculture, however, is central to Sri Lanka's economy. It employs some 35% of the country's workforce and accounts for around 20% of GDP. Raising agricultural productivity is, therefore, an important component of the Sri Lanka Poverty Reduction Strategy Paper (PRSP). Accordingly, an important step in the development of a GVEP Action Plan for Sri Lanka will be to gain a better understanding of the impact of limited commercial energy supplies on agricultural productivity.

Sri Lanka's total primary energy demand is met largely with biomass (which contributes 50% of supply) and petroleum (41%). Nearly 76% of demand for biomass (mainly from crop residues and home gardens) is used in households for cooking. The remaining 24% of demand for biomass is from industry, including the plantation industries. The share of petroleum in the energy mix is expected to grow in the future as (i) annual electricity demand is growing at around 7%, (ii) the country's remaining undeveloped hydropower resources are limited and, (iii) there is a growing demand for transport fuels. With the exceptions of biomass and hydropower, Sri Lanka is poorly endowed with

primary energy resources and faces rising imports of commercial energy to realize economic growth. Sri Lanka's electricity grid reaches into most of the country's rural areas with the exception of the Northeast region, which suffers from the impact of the ongoing insurrection led by Tamil groups seeking independence. The existing rural electricity distribution system is of modern design and is reasonably well maintained and operated. Much of this infrastructure was developed over the past 25 years with grants and concessional loans from donor agencies. In the late 1990's, however, the growing insurrection in the northeast, the resulting negative impact on economic growth, and the apparent inability of the government to address the issues led to a sharp withdrawal of international donor support. This situation was reversed following the 2001 election in which the United National Front (UNF) party gained a parliamentary majority. The UNF, which has advocated private-sector led growth in Sri Lanka, was also successful at signing a cease fire agreement with the Tamils. Since that time, international donor funding to grid extension projects has quickly resumed.

Some of the key issues that Sri Lanka faces in its energy sector include:

- Political instability including for example the recent dissolution of Parliament and the calling of snap elections
- Lack of energy sector data necessary to understanding the requirements of GVEP efforts
- Weaknesses in national RE efforts to date including a lack of pro-poor tariffs and a concurrent lack of focused subsidy implementation
- Lack of education efforts geared toward rural consumers on income generating opportunities that follow from electricity access

The Government of Sri Lanka (GOSL) has stated its intentions to restructure the power sector along commercial lines and to establish improved regulatory mechanisms over the next five years so as to attract investment in the sector. It also plans to establish a credible rural electrification and renewable energy policy to promote sustainable market-based provision of rural energy services to reduce the need for larger grid investments. Currently planned projects are expected to provide power access to 285,000 new rural customers over the next five years.

Sri Lanka was one of the first countries to join GVEP during the World Summit on Sustainable Development in Johannesburg in August 2002. The GOSL designated the Ministry of Power and Energy as the key ministry for coordinating the development of its initial GVEP Action Plan. CORE International has been providing support to the GOSL in this effort, building on its GVEP technical support experience in Zambia. As a result of previous support provided to Sri Lanka by USAID, the country had achieved the following milestones:

- Initiation of the GVEP Action Plan development support to Sri Lanka through an initial strategy meeting with the then Secretary of the Ministry of Power and Energy, October 2003.
- Development of an extensive Poverty Reduction Strategy Paper (PRSP) that has been endorsed by the multilateral development banks and the IMF, and is part of



GOSL's overall economic reform and development program titled "*Regaining Sri Lanka*".

- Implementation of an official GVEP Secretariat within the Ministry of Power and Energy (MP&E).
- An inaugural meeting of the Sri Lanka GVEP Working Group at the Ministry of Power and Energy on March 22, 2004.
- Facilitation of a Technical Consultation meeting among the Sri Lankan stakeholders on the Formalization of the GVEP Working Group and Planning for the National GVEP Action Plan on May 27, 2004, with representation of almost all stakeholder groups including government, the private sector, consumer groups, NGOs, academia, and donors. As a result of that consultation meeting, (i) recommendations were made for an operating modality for the Working Group for preparing an initial GVEP Action Plan, and (ii) initial areas of focus for the development of specific GVEP Action Plan projects were identified.

## **B. Task 1: Support to the GVEP Working Group and Secretariat**

As part of this task, the team continued to provide its support to the GVEP Working Group (WG) in collaboration with our local partner, Energy Forum. One of the key issues expressed by the Government of Sri Lanka with respect to any formalization of a GVEP WG and a Secretariat was the amount of support the government could expect under the GVEP program from the donor community. The government is willing to formalize the process and hold a National Stakeholders' Workshop if this activity is supported in some way by the international donor community through the GVEP program.

The support provided by the Energy Forum team to the Government of Sri Lanka included discussions on (i) operating structures of the WG and the Secretariat, (ii) mission and function of these organizations, (iii) modalities of stakeholder coordination, (iv) integration of GVEP program initiatives with other national initiatives, such as the National Energy Policy, Sri Lanka's Poverty Reduction Strategy Paper, and ongoing donor funded energy and other cross-sectoral programs, and (v) program financing and sustainability. Specifically, the team provided assistance to the government in the development of a funding proposal for the start up of the GVEP WG and the Secretariat.

During the past year, the Sri Lankan government has gone through a number of changes which have delayed the process of engagement of the government with the GVEP program. During discussions with the government, the responsibilities for the start up of the GVEP program were shifted to the Energy Conservation Fund (ECF), a separate entity established by the government and the Chairman of this Fund, former Secretary of Power, was designated as the GVEP Program Coordinator. The team worked with the Chairman and staff of the ECF to bring them on board with respect to the next steps of the GVEP planning process. The Energy Forum team developed a funding proposal developed a funding proposal for the Energy Conservation Fund to submit to the GVEP Program in UK for financial support in order to formalize the functions of the GVEP Secretariat and implement an action plan involving the GVEP

WG including the launch of the first National Stakeholder Workshop. Annex I includes a draft proposal which has been provided to the ECF.

For a variety of institutional and procedural reasons, the process was not picked up as well as it should have been. Furthermore, with the tragic event of the tsunami disaster, many of the initiatives in the government have taken a back seat as the reconstruction of the country has become a top priority. CORE International, through its subcontractor Energy Forum, has provided support to the ECF in designing a funding proposal for the start up of the GVEP program which seems to be the greatest bottle neck and the main reason for somewhat slow progress by the government in this area.

## **C. Task 2: Sri Lanka Multi-Stakeholders Technical Meeting**

Due to the shift of primary focus to Zambia, it was discussed and agreed upon by CORE and its counterparts in Sri Lanka, that in terms of reaching our goals it would not be the most effective to hold a Multi Stakeholder meeting at this stage, but rather facilitate a highly involved working session with the Board of Directors of Energy Forum, CORE's local partner in Colombo under its GVEP Task with USAID.

CORE team representatives, Vinod Shrivastava, President and CEO, and Marika Robertson, Project Analyst, visited Colombo during the period November 13 – 16, 2004, where they were joined by experts from Energy Forum for the work session with the organization's Board of Directors, as well as a meeting with USAID and a meeting with Mr. Michael Warnakulasooriya, Chairman of the Energy Conservation Fund who has been designated as the GVEP Coordinator by the Government of Sri Lanka.

A number of action items and conclusions were reached at these meetings. Among them the most important item was the need for a review of Sri Lanka's National Energy Policy and a stakeholder workshop to develop recommendations for the reform of the policy which is over 10 years old.

CORE's local partner, Energy Forum has previously worked on the process for reforming Sri Lanka's national energy policy. A lot of intellectual capital was invested but there are no results to show, mainly, because of the political problems in the country. There appears to be a general consensus among various stakeholders to push for new legislation rather than amendments to reform existing policy. For example, many stakeholders feel that there ought to be a stand-alone Renewable Energy Act, given the potential of renewable energy in Sri Lanka.

The process for making new laws in the country requires collecting a critical number of votes in the Parliament, which can be accomplished by selecting the right party to introduce the legislation. The Law making process has essentially been a top-down approach with little, if any, participation by stakeholders in a bottom-up approach. Best practices around the world confirm that energy policy reform is sustainable if it brings the civil society into the process.

## **Objectives of the Proposed Stakeholder Workshop**

This concept paper is prepared to outline the need for a National Stakeholder Workshop dedicated to a review of Sri Lanka's national energy policy and make specific recommendations to the government for policy reform and new legislation as needed. It is proposed that a one-day stakeholder workshop be held to provide a forum for free discussion on a variety of topics in order to arrive at specific policy recommendations. The topics to be included in the proposed workshop may include the following:

- Overall National Energy Policy and Strategy and areas where reform is needed
- Potential advisability of a separate legislation promulgating the country's national rural electrification policy including the role of renewable energy in such a policy
- Fiscal and financial policy interventions to accelerate the entry of private sector in rural electrification based on proven institutional, business, and financial models
- Role of provinces and the need for decentralization of rural electrification policy thereby permitting local communities to take a more active role in the provision of rural energy services
- Process of coordination of the roles of government, the private sector, and the consumer
- Potential approaches for communications and outreach and public participation in energy policy reform
- Opportunities for improving energy sector governance at all levels – government, service providers, and the regulators in order to serve the rural consumer better

### **Planning Process**

The planning process for the proposed stakeholder workshop will require the following steps:

- Defining specific objectives to be achieved during the workshop
- Defining the stakeholders – government, private service providers, consumer groups, regulatory bodies, community organizations, NGOs, and other segments of the broader civil society
- Defining discussion items
- Approach to the facilitation of the workshop
- Defining the deliverables of the stakeholder workshop

### **Next Steps**

At the end of the Mission, the CORE Team recommended to USAID that the USAID Mission in Sri Lanka and the EGAT Bureau in USAID Washington jointly consider funding the proposed Stakeholder Workshop. CORE International has an active USAID Task Order – Advisory Assistance in Energy Sector Transformation (AASET) with a ceiling of \$7.5 million. Dr. Kevin Warr, Governance Advisor at the EGAT Bureau in USAID, Washington is the CTO for this Task Order. It is recommended that Dr. Warr and officials from the USAID and USAEP Mission in Sri Lanka hold discussions to explore a joint sponsorship of the proposed national Stakeholder Workshop. This would be a major step in beginning the process of energy sector governance in Sri Lanka.



According to the Chairman of ECF, the Ministry of Power and Energy in Sri Lanka is psychologically ready to proceed in this direction. The government already has an inter-ministerial committee for energy issues which could act as the nodal government group to cosponsor the proposed workshop.

#### **D. Task 3: Support for a Public Participation and Public Awareness Strategy**

Sri Lanka has made a significant progress in energizing its civil society sector and most of the government departments operate on the basis of both effective public communications and outreach as well as civil society participation in energy sector governance. The government planners appreciate the value of public participation and consumer awareness in relationship to launching a National GVEP Program. The civil society structure in Sri Lanka includes scores of NGOs, consumer groups, farmers' groups, business associations, student groups, consumer watchdog groups, etc., all of whom are actively involved in dialogues with government departments and energy service providers on a regular basis. Therefore, there was not much provided by CORE in this area.

### **IV. Global Village Energy Partnership (GVEP) Initiative in Zambia**

#### **A. Background**

Three-quarters of Zambia's population lives below the World Bank poverty threshold of \$1 a day. Most of these people depend strongly on traditional fuels to meet their daily energy needs and access to affordable electricity and modern sources of energy remains a developmental challenge. Wood-fuel in the form of charcoal and firewood contributes 79% of total national energy consumption. Electricity makes up 10% of the mix (the majority of which is generated via hydropower, and the majority of which is consumed by the mining sector), petroleum products contribute 9% and coal is 2% of total consumption. While the average national electrification rate is roughly 20%, the rate of access in the rural regions is around the 2% level. Reliance on traditional energy sources (as opposed to conventional modern fuels) puts poor households in a disadvantaged situation as more money is spent for each unit of energy consumed.

Some of the key issues that Zambia faces in its energy sector include:

- Heavy reliance of rural populations on biomass for their energy needs.
- Weak institutional arrangements and financing mechanisms originally intended to encourage rural energy provision.
- Subsidization of power tariffs which has had the effect of discouraging investments particularly in rural areas.
- Slow economic growth, which has diminished the ability of government to provide improved public services including RE.

The Zambian government has shown a strong commitment to its participation in the GVEP initiative. Its Poverty Reduction Strategy Paper (PRSP) makes improved access to modern energy services a key priority, and this was a key consideration for Zambia's

inclusion in the GVEP initiative. Through its Ministry of Energy and Water Development (MEWD) Zambia joined GVEP in February 2002, and in June 2003 the Zambia National GVEP Secretariat was established at the Department of Energy (DOE).

The Zambian Secretariat has worked to recruit domestic stakeholders interested in collaborating in energy/poverty issues in Zambia through the GVEP framework. The Secretariat has since requested funds from the GVEP Technical Secretariat in Washington D.C. for support of a national consultative process to develop a GVEP Action Plan. The Action Plan would form the basis for potential funding requests for targeted GVEP interventions to enhance the use of modern energy services for poverty reduction.

Enhancing energy services to support poverty alleviation and development is one of the highest priorities of the Zambian government. A lack of financial resources, however, is a major obstacle to accessing alternative energy sources. By helping to mobilize capital, the GVEP initiative can lend support to improvements in social services and the expansion of local economic opportunities in the rural and peri-urban areas of Zambia. Toward this goal the government plans to:

- Formalize and institutionalize participation in GVEP by facilitating the creation of organizational structures, and coordinate at the national level with local partners throughout the country.
- Facilitate and help organize stakeholder meetings and initiate in-country consultations amongst stakeholders on GVEP
- Integrate GVEP in the country policy framework, especially the Poverty Reduction Strategy Paper (PRSP) and the plan for rural electrification.
- Develop an actionable GVEP Plan that could be presented to donors and other stakeholders for follow up support.

## **B. Task 1: Support to the GVEP Working Group and Secretariat**

### **GVEP Working Group Operating Modality (Working, Monitoring, and Reporting Procedures)**

On October 27, 2004 a National GVEP Working Group (WG) Technical Consultation (TC) meeting took place in Lusaka, Zambia. This consultation was conducted under the leadership of the Department of Energy (DOE) at the Ministry of Energy and Water Development (MEWD). Mr. Oscar Kalumiana, Director at the Department of Energy (DOE); and Mr. Matthew Addison and Mr. Dinesh Wahi, from CORE International, were the TC facilitators.

A total of 35 stakeholder representatives participated in the TC, representing participants from earlier meetings and new stakeholders (a complete list of stakeholder participants is enclosed as Annex II to this report). Representation in this technical consultation covered almost all GVEP stakeholder groups including government

agencies, private sector, consumer groups, NGOs and academia, energy sector regulator, and various donor representatives<sup>1</sup>.

The Honorable Alex Musanya, Deputy Minister of the Ministry of Energy and Water Development (MEWD), opened the meeting, thanked the participants and invited them to openly discuss Zambia's participation in the GVEP. He also expressed MEWD's deep appreciation to USAID for providing timely and strategic assistance by mobilizing CORE International to support the facilitation of GVEP related activities in Zambia. The complete speech of Minister Musanya is enclosed in the Annex C.

Among the key issues focused on in the discussions, were

- the composition of Zambia GVEP Working Group and Subcommittees, and
- the WG Subcommittees' Activities and Membership.

The TC participants were very active and there was considerable discussion among them on the issues listed above. Many participants made valuable contributions during the discussions. The audience split into four groups representing each of the four proposed subcommittees of the GVEP Working Group. Their purpose was to (a) review and recommend changes to the TORs for the GVEP WG; (b) propose members of the GVEP WG; (c) review and recommend changes to the TORs for the GVEP WG subcommittees; (d) propose members from the GVEP WG for the subcommittees; and (e) review and recommend the National Action Plan.

Each group approached the work from differing points of view and this added to the richness of the experience and the output. There were several important outcomes of this exercise.

1. There was some disagreement over whether the appropriate Ministry was Local Government and Housing or Community Development and Social Services. This needs to be clarified by reviewing the role of both agencies to determine the most relevant and, if appropriate, to include both.
2. It was noted that when the committee was first proposed that the REA was not in existence. Now, with its constitution, it is important to include the REA as a member of the GVEP WG.
3. Where earlier an individual had been proposed to be a member of GVEP, it was recommended in certain cases that the attendance be from a diversified body on a rotational basis. It was suggested that this would serve to acquaint a larger group with GVEP and extend GVEP influence. GVEP would also benefit from broader representation. For example, it was proposed that instead of a single donor, that the Donor Forum be represented on a rotational basis. It was recommended that the Bankers Association serve for the financial institution, the

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<sup>1</sup> The representatives of the Swedish Embassy, and German Embassy participated in the in-country GVEP Technical Consultation.



Zambia Association of Chambers of Commerce and Industry (ZACCI) serve as the large industry representative, and the ZACCI Small and Medium Business Association (SMBA) as a small business representative, differing colleges of the University of Zambia and a Donors' forum all be members on a rotational basis.

4. Proposed membership of the subcommittees (Detailed suggestions are enclosed in Annex III: GVEP Working Group Subcommittees: Activities and Membership).

Organization	Policy	Finance	Technical	Outreach
MEWD	X	X	X	X
MoF	X	X		
MoE				X
MoH				X
MoA&C	X			
MLG&H				X
M CD&SS*			X	
Financial Institution		X		
Large Industry			X	
SME		X		
ERB	X			
REA*	X	X	X	X
NGO 1	X			
NGO 2				X
University			X	
Donor		X		
CAZ 1				X
CAZ 2	X			

5. All the focus groups in one way or another identified the ability to pay as the main challenge facing rural electrification and, therefore, finding ways of addressing this as a key TOR for GVEP WG subcommittee. For the technical subcommittee, this could mean a focus on low cost technologies and identification of replicable productive uses. For the policy committee, this could mean focusing on policies that provide incentives to developing low cost technology or remove obstacles to technology development and manufacture. For the finance and private sector committee, this could mean developing appropriate public private partnership business models. For the Outreach and Information subcommittee, it could mean better promotion of opportunities for investors or sharing of successful productive use case studies with other rural areas. Finally, for all subcommittees this should mean focusing on the identifying and enhancing the productive uses of energy.

At the end of the TC, relevant to the GVEP WG operating modality, the stakeholders resolved the following:

- Addition of the REA to the GVEP Working Group (WG)
- Agreement on the TORs for the GVEP WG
- Agreement on the composition of the GVEP WG subcommittees
- Agreement on the TORs for the GVEP WG Subcommittees

### **GVEP Action Plan Blue Print**

As another important subject of the October 27, 2004 National GVEP WG Technical Consultation, the stakeholder representatives discussed the major elements of the GVEP National Action Plan. As a result, several important suggestions were made, such as:

1. Several stakeholders rightly pointed out that GVEP must not be exclusively about electricity but rather about energy. There is a transition among fuels that is established by economics and GVEP and the GRZ programs must look at this.
2. The key to expanding rural energy access is to (GVEP) focus on creating demand or on promoting productive activities. The example was given of communities that sought out activities and other development assistance that would enhance community economic development and thereby create the demand, and ability to pay for electricity. This was one side of the issue. Others stressed that without adequate renewable resource assessments, such as wind maps and hydrological data, private investment would not be forthcoming.

The agreed key elements in the Action Plan are reflected in Annex IV: Initial Action Plan for GVEP Activities in Zambia.

### **C. Task 2: GVEP Policy Goals Definition**

#### **Coordination of GVEP Goals with the Government of Zambia's Poverty Reduction Strategy Paper**

The National GVEP WG Technical Consultation meeting on October 27, 2004 also facilitated discussions on integrating the GVEP Initiative in the country with the Government of Zambia's Poverty Reduction Strategy Paper. The discussion on the importance of aligning GVEP with the PRSP resulted in a number of recommendations and an agreement on a way forward:

1. There is recognition of the role of energy in reducing poverty throughout the Zambian PRSP. Some of the sectors explicitly recognize the need to develop and supply energy inputs to the sector. For example, agriculture identifies "provide electricity in high potential areas" and "construct and rehabilitate rural dams and irrigation facilities" as key activities. The industrial sector recognizes the need to "encourage the rehabilitation and expansion of energy..." for investment promotion and in rural industrialization "facilitating the provision of

appropriate energy sources for small and medium-scale entrepreneurs, especially rural-based ones”.

2. Recognizing that the PRSP and the programs that flow from it are dynamic, two key ways of mainstreaming GVEP and coordinating it with the PRSP were identified:
  - a. The first idea is to include the head of the Ministry of Finance's Sector Advisory Group as the MoF representative on the committee. The Sector Advisory Group is one of the main PRSP bodies. This would insure a two-way flow of information on an ongoing basis and thereby keep the PRSP and GVEP current of each other's activities.
  - b. The second idea is that through the pursuit of economic or productive uses of energy and their successful implementation, GVEP will be in the vanguard of rural poverty reduction. By implementing the first idea, the lessons learned from the second will flow into PRSP. It has the potential to become a self-reinforcing mechanism.
3. The Energy Sector Advisory Group of the PRSP should be strengthened and also made a part of the GVEP WG.
4. Another recommendation was to include as GVEP WG members those persons in each ministry who are responsible for the PRSP. This would ensure a two flow of information from the both groups.

### **Monitoring Procedures for Meeting GVEP Policy Goals**

As part of the GVEP Blueprint, the CORE team assisted the GVEP Secretariat and the GVEP WG in Zambia in developing procedures for integrating the GVEP policy goals with other national policy objectives including the government's National Energy Policy and the National Rural Electrification Program. Specifically, the CORE team developed the following benchmarks for monitoring the progress of the GVEP policy objectives:

- Number of individual households with access to electricity either through the grid or through stand alone systems as a result of GVEP initiatives.
- Any observed changes in income generation in rural households as a result of improved and new electricity services.
- Cross-sectoral impacts of energy availability to the rural population, such as better infrastructure, improved healthcare, improved irrigation and drinking water services, improved small industries development, etc.
- Improved sector governance procedures such as entry of small scale service providers in the energy markets, more affordable tariffs, and better civil society participation in national energy sector policy making.

These and other monitoring benchmarks were included in their GVEP plan by the GVEP Secretariat within the Ministry of Energy and Water Development (MEWD). They were also included as part of their proposal to the GVEP Secretariat in UK, which has since been funded.



### **Criteria for Prioritizing GVEP Policy Goals**

Through several iterations with the members of the GVEP WG, the process for prioritizing GVEP policy goals was developed and included in the Zambia GVEP blueprint. This process is currently underway as part of the ongoing GVEP work, being led by the GVEP Secretariat under funding from the GVEP program in UK.

### **D. Task 3: Renewable Resources Assessment Design**

#### **Assistance for the Development of a National Small Scale Hydropower Resources Assessment Program**

As per the Task Order requirements, CORE provided assistance for the development of a National Small Scale Hydropower Resources Assessment Program. A preliminary Small Hydro Resource Assessment is enclosed with this report as Annex V.

### **E. Task 4: Electricity-Water Nexus and its Implications for GVEP**

As part of the overall policy objectives of GVEP program in Zambia, an important element included the ability with which energy provision under the GVEP program could spur the availability of water and irrigation for agricultural production. Currently in Zambia, the farming community uses both energy and water for irrigation inefficiently. Routinely, the farmers use higher specification irrigation pumps to pump water in order to counteract the poor quality and reliability of electricity. At the same time, the farmers continue to pump water whenever they can and store it in improper and leaking wells which are not covered, thereby pumping more water than they need and wasting it. Therefore, energy service delivery programs in the rural sector in many countries are focusing on the water-energy nexus in order to ensure that both energy and water are used efficiently.

To this extent, given that Zambia is an agricultural economy and has a sizable need of irrigation systems, the GVEP program should integrate the overall water sector policy objectives of the government in addition to the provision of rural energy. This issue was discussed in substantial detail with the GVEP Secretariat and WG in numerous sessions, which also included analysis of water-energy nexus case studies in several countries.

Currently, the GVEP Secretariat is incorporating the electricity-water nexus implications into its GVEP Action Plan being finalized under funding from the GVEP program in UK.

### **F. Task 5: GVEP and the Rural Electrification Master Plan**

#### **Review of the Rural Electrification Plan**

CORE International has been coordinating its work with both the World Bank and the Swedish International Development Agency (SIDA). Our coordination with the World

Bank has included specific recommendations to the World Bank on the structure of both the National Rural Electrification Agency, and the National Rural Electrification Fund. Key aspects of our recommendations have been included by the World Bank as part of conditionalities in its Integrated Access to Energy Services (IAES) loan currently being prepared.

Our coordination with SIDA has focused on SIDA providing funding for the development for a National Rural Electrification Plan for Zambia. For over two years, SIDA and the Government of Zambia have been in discussions for SIDA to finance the development of a Rural Electrification Master Plan. In December 2004, SIDA agreed to fund the development of the Rural Electrification Master Plan. The Ministry of Energy and Water Development, and the newly established Rural Electrification Agency have issued a tender for a selection of consultants to develop a Master Plan. The tender evaluation process is underway and it is expected that a consultant will be on board to undertake this activity, which also include the design and development of a number of pilot projects. A considerable amount of work done by CORE in Zambia led to a more sound basis for the assistance provided by SIDA to the Government of Zambia.

### **Suggested Rural Poverty Reduction Interventions**

Following up on the October 27, 2004 National GVEP WG Technical Consultation, a second mission went to Zambia in early December. The team members, Matthew Addison, Vice President and Director of Programs, and Victoria Racz, Project Analyst met with key stakeholders including the newly formed Rural Electrification Authority and to finalize the Rural Poverty Reduction Intervention Paper. A complete Rural Poverty Reduction Intervention Paper, developed by CORE is enclosed as Annex VI to this report.

### **G. Task 6: Public Awareness Program Design**

#### **Design, Implementation and Monitoring of the GVEP Energy and Poverty Reduction Public Awareness Campaign**

As a contractual requirement, CORE designed a GVEP Energy and Poverty Reduction Public Awareness Campaign, enclosed as Annex VII to this report.

### **V. Conclusions and Recommendations for Future Activities**

Based on CORE's analysis of the current situation in the energy sector of Sri Lanka, the country's commitment to become further involved with GVEP, and discussions held with the Sri Lanka energy sector stakeholders, the following actions are recommended for consideration:

- A key aspect of the GVEP Action Plan preparation is their integration with the countries' Poverty Reduction Strategy Paper (PRSP). For Sri Lanka, this will require the development of new rural (and possibly peri-urban) "consumer" data and considerable analysis to allow clear understanding of the real linkages between commercial energy supply enhancement on the one hand, and cross-sector benefits on the other hand. These include rural income generation and

improvements in agricultural production, health care services, education, infrastructure, and trade.

- There is a consensus among the energy sector stakeholder representatives that there is a dire need for review of the Sri Lanka's National Energy Policy and a stakeholder workshop to develop recommendations for the reform of the policy which is over 10 years old.
- Due to political problems that have constrained the implementation of amendments to reform the existing energy policy, there is a general support among the stakeholders to focus future efforts on realizing the potential success of new legislation instead. For example, many representatives feel that there ought to be a stand-alone Renewable Energy Act, given the potential of renewable energy in Sri Lanka. This could be achieved by introducing a bottom-up approach with the involvement of the civil society and its influence on the party representatives in the parliament to collect a required number of votes.
- The ECF should finalize and submit its funding proposal to the GVEP Secretariat in UK in order to secure funding that would help in formalizing the working of the GVEP Secretariat and the Working Group in Sri Lanka and pave the way for launching the first National GVEP Workshop in the country.

With respect to the continuation of GVEP activities in Zambia, our conclusions and recommendations are as follows:

- Zambia is considerably ahead of Sri Lanka in its GVEP planning process. The MEWD has already formally established a functioning GVEP Secretariat and an operational GVEP Working Group, composed of stakeholders from different segments of the society. There have been several workshops and individual working groups have been formulated within the overall GVEP WG to address different aspects of GVEP program objectives.
- Institutionally, the government has taken major steps that support and accelerate the GVEP planning process. These include (i) the establishment of a Rural Electrification Agency, (ii) restructuring of the National Rural Electrification Fund, (iii) successful conclusion of its dialogue with SIDA to secure funding for the preparation for the National Rural Electrification Master Plan, (iv) establishment of a Task Force for a revision of the National Energy Policy, (v) articulation of a National Rural Electrification Policy within the overall National Energy Policy, and (vi) integration of the GVEP initiative with Zambia's Poverty Reduction Strategy Paper.
- Now that Zambia has received funding for operationalization of its GVEP program, it is recommended that the GVEP Secretariat in Zambia should finalize its GVEP Action Plan including the identification priority projects, financing requirements, and implementation schedule. In addition, the government should

schedule and implement the launch of a National GVEP Workshop as soon as possible in collaboration with the GVEP Secretariat in UK.



## **ANNEX I: BLUEPRINT FOR A PROPOSAL FOR FUNDING THE GVEP WORKING GROUP AND SECRETARIAT IN SRI LANKA**

**Energy Conservation Fund  
Government of Sri Lanka**

**Draft Proposal  
Funding for National GVEP Action Plan Development**

**Submitted to  
GVEP Secretariat  
Surrey, England**

**Submitted by  
Chairman  
Energy Conservation Fund  
Colombo, Sri Lanka**

**February \_\_\_\_, 2005**

## GLOBAL VILLAGE ENERGY PARTNERSHIP PROPOSAL FOR SUPPORT TO THE SRI LANKA NATIONAL GVEP ACTION PLAN DEVELOPMENT

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### 1. Background

Sri Lanka was one of the first countries to join GVEP during the World Summit on Sustainable Development in Johannesburg in August 2002. The GOSL designated the Ministry of Power and Energy as the key ministry for coordinating the development of its initial GVEP Action Plan.

As a result of previous support provided to Sri Lanka, the country has achieved the following milestones:

- Initiation of the GVEP Action Plan development support to Sri Lanka through an initial strategy meeting with the then Secretary of the Ministry of Power and Energy, October 2003.
- Development of an extensive Poverty Reduction Strategy Paper (PRSP) that has been endorsed by the multilateral development banks and the IMF, and is part of GOSL's overall economic reform and development program titled "*Regaining Sri Lanka*".
- Implementation of an official GVEP Secretariat within the Ministry of Power and Energy (MP&E).
- An inaugural meeting of the Sri Lanka GVEP Working Group at the Ministry of Power and Energy on March 22, 2004.
- Facilitation of a Technical Consultation meeting among the Sri Lankan stakeholders on the Formalization of the GVEP Working Group and Planning for the National GVEP Action Plan on May 27, 2004, with representation of almost all stakeholder groups including government, the private sector, consumer groups, NGOs, academia, and donors. As a result of that consultation meeting, (i) recommendations were made for an operating modality for the Working Group for preparing an initial GVEP Action Plan, and (ii) initial areas of focus for the development of specific GVEP Action Plan projects were identified.

In October 2002, the Energy Sector Assistance Management Program (ESMAP) organized a workshop entitled: How Can Modern Energy Services Contribute to Poverty Reduction? At this workshop, the GVEP member countries were encouraged to identify key areas that would form the basis for the development of individual country National GVEP Action Plans with poverty reduction at the centre of the overall national objectives. The identified action areas appear in Appendix 1.

### 2. Objectives

The objectives of this project are as follows:

- (i) Formalize and operationalize the Sri Lanka GVEP Secretariat and the GVEP Working Group
- (ii) Hold national consultations regarding Sri Lanka's role in meeting GVEP objectives
- (iii) Identify and prioritize projects/activities in the Agriculture, Education, Health, Water, Communication and SMEs sectors
- (iv) Seek funds for the implementation of the identified projects through the GVEP window

### 3. Activities & Deliverables

The project will comprise activities that support a GVEP Action Plan development process for GVEP activities in Sri Lanka. Given that the role of energy in poverty reduction is not well understood and also that there has to be a paradigm shift from a sectoral perspective to multi-sectoral approach to poverty reduction projects, there is need to raise awareness among stakeholders on these matters.

Once awareness has been raised, stakeholders will be consulted to identify activities that will constitute a GVEP Action Plan for Sri Lanka over a 10-year period. Briefly, the table below provides a summary of the activities that will be needed as part of the GVEP Action Plan development and national consultation with stakeholders:

Activity Description	Activity Detail	Activity Deliverable(s)
Stakeholder Consultation	One National Stakeholders Consultative Workshop	Workshop report containing prioritized projects for implementation in the following sectors: Agriculture Education, Health, Water, SMEs and Tele-communication
National Action Plan	Detailed National Action Plan for operationalizing GVEP supported activities in Sri Lanka over the next 10 years	National Action Plan Report

### 4. Management Arrangement

The Sri Lanka National GVEP Secretariat will manage the project in conjunction with the Energy Conservation Fund, established within the Ministry of Energy and Power, which is currently supporting ECF with office space, technical staff and communication facilities. The GVEP Secretariat will closely work with the GVEP Working Group. The GVEP Working Group will be divided into several Sub-Working Groups to take lead in specific areas such as data collection and research, project development, customer



surveys, project analysis and prioritization, coordination with other parts of the Government and various donors, and the overall stakeholder engagement. Appendix 2 includes a list of the Sri Lanka Rural Electrification Working Group which would be rolled into a GVEP Working Group.

## **5. Time Table, Budget and Financial plan**

This project will run for a period of twelve (12 months) from March, 2005 to October, February 2006. The expected financial support from GVEP is US \$83,116. Appendix 3 provides a schedule of activities over the 12 month period. Appendix 4 includes details of our proposed budget.

## **6. Reporting**

The GVEP Secretariat located within the offices of the Energy Conservation Fund will be responsible for the execution of this initiative. The following reports will be submitted to the GVEP Secretariat in Surrey, England.

- First Report will be submitted within sixty days of the receipt of funding. This report will include the following:
  - First National Stakeholder Workshop meeting minutes, with preliminary project identification and indicative work plan
  - Progress on collection of baseline data
  - Financial statement
- Quarterly Progress Reports will be submitted every three months after the start of the program
- A Final Report will be submitted at the end of 12 months from the start of the project. The Final Report will include the following:
  - Prioritized projects for implementation in all the key sectors
  - National 10-year GVEP Action Plan
  - Proposal for continued GVEP support to the Sri Lanka National GVEP Secretariat

## Appendix 1: Priority Action Areas identified in October, 2002

### (a) Consultation Process

- ❑ To assess individual country capacity to implement a multi-sectoral approach to energy provision
- ❑ Paradigm shift – new approach to integrate energy interventions across sectors
- ❑ Review current rural electrification program
- ❑ Draw a Rural Electrification Master Plan

### b) Target Sectors

#### ❑ Agriculture

- Small scale Irrigation
- Value adding agricultural processing

#### ❑ Health

- Solar electrification for remote rural health centers
- Grid extension to health centers near supply

#### ❑ Education

- Solar electrification for remote rural schools
- Grid extension to schools near supply

#### ❑ SMEs

- Modern Energy for non-farming enterprises
- Water
- Resource development
- Delivery modes
- Water, sanitation, health education

#### ❑ Cross cutting issues

- Best practices on energy use & provision
- Equitable energy provision
- Utilization of energy in diagnostic services/laboratory services towards prevention and treatment of HIV/AIDS related diseases

Environment mitigation through appropriate use of energy resources (e.g. biomass)

## Appendix 2: Sri Lanka Rural Electrification Working Group

- |  |   |
|--|---|
| 1. Mr. P Weerahannadhi<br>The Secretary<br>Ministry of Power & Energy<br>No.80, Sir Ernest De Silva Mawatha<br>Colombo 07                      | Deputy Secretary<br>North East Province<br>Infrastructure Development<br>Inner Harbor Road<br>Trincomalee   |
| 2. Mr. W.B.Dissanayake<br>Ministry of Power & Energy<br>No.80, Sir Ernest De Silva Mawatha<br>Colombo 07                                       | 10. Mr. Lalith Guneratne<br>Energy Forum<br>No.247, Polhengoda Road<br>Kirulopana<br>Colombo 05   |
| 3. Mr.M.A.Warnakulasooriya<br>Chairman<br>Energy Conservation Fund<br>3 G-17,BMICH<br>Baudhaloka Mawatha<br>Colombo 07                         | 11. Mr. Asoka Abeygunawarredana<br>Energy Forum<br>No.247, Polhengoda Road<br>Kirulopana<br>Colombo 05  |
| 4. Ms. S. Wijebandara<br>Add. Secretary<br>Ministry of Rural Economic Development &<br>Small industries<br>No.780, Maradana Road<br>Colombo 10 | 12. Mr. Anura Widanagamage<br>7. Dept. Director<br>Industrial Services Bureau<br>141, Kandy Road<br>Kurunegala  |
| 5. Prof. Priyantha Wijethunga<br>Public Utility Commission of Sri Lanka<br>6 <sup>th</sup> Floor, Merchant Tower<br>Colombo                    | 13. Mr. Chandraratne D. Vithanege<br>Chamber of Commerce<br>No.450, D.R.Wijewardana Mawatha<br>Colombo 10   |
| 6. Mr.Bandusena<br>National Planning Department<br>Ministry of Finance<br>General Treasury<br>Colombo 01                                       | 14. Mr. Salman Halwathura<br>NGO Secretariat<br>National Secretariat Non Governmental<br>Organisation<br>5 <sup>th</sup> Floor, Sethsiripaya<br>Bathtaramulla |
| 7. Mr. Jayantha Nagendran<br>Director/ Administrative Unit<br>RERED Project<br>Co. DFCC Bank<br>73/5,Galle Road<br>Colombo 03                  | 15. Mr. Neil Fernando<br>Asst. Director (Planning)<br>District Secretary<br>Secretary Office<br>Moneragala District   |
| 8. Secretary, Chief Ministry<br>Sabaragamuwa Provincial Council<br>New Town<br>Rathnapura  | 16. Mr.Harsha Wickramasinghe<br>Director ( Projects )<br>Energy Conservation Fund<br>3 G-17,BMICH<br>Baudhaloka Mawatha<br>Colombo 07                         |
| 9. Mr. T.Thawasalingam   |   |

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24. Mr. T Jayawardane  
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25. Mr. Bandula Chandrasekara  
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26. Mrs. Wathsala Herath  
Energy Forum  
No.247,Polhengoda Road  
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### Appendix 3: Proposed Work Plan Sri Lanka GVEP Action Plan Development Funding Proposal

Activity	2005										2006	
	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Newspaper adverts	X	X		X								
TV Discussions	X		X		X	X	X					
National GVEP Partners' meetings		X		X		X		X		X		X
National Stakeholders Workshop						X						
Collection of Baseline Data	X	X	X	X								
Meetings with the GVEP Working Group	X		X		X		X		X		X	
GVEP Sri Lanka Home Page Development and Updating			X			X			X			X
Drafting the National GVEP Action Plan									X			
Presentation of the National Action Plan to the Stakeholder Community										X		
Finalization of the National GVEP Action Plan												X

**Appendix 4: Proposed Budget (To be Finalized by the ECF)  
Sri Lanka GVEP Action Plan Development Funding Proposal**

Activity	Number	Unit cost	Total Cost	Source of funds
Mobilization and Office Set up	12 Months	\$400	In kind	Energy Conservation Fund Government of Sri Lanka
Provision of Technical staff				
<i>GVEP Coordinator</i>	12 Months	\$1,500	\$18,000	GVEP Secretariat, U.K.
<i>GVEP Project Officer</i>	12 Months	\$1,000	\$12,000	GVEP Secretariat, U.K.
Newspaper Advertisements	3	\$400	\$1,200	GVEP Secretariat, U.K.
TV Discussions	3	1,000	\$3,000	GVEP Secretariat, U.K.
National Stakeholders Workshop	1	6,000	\$6,000	GVEP Secretariat, U.K.
GVEP National Partners, Meetings	6	1,000	\$6,000	GVEP Secretariat, U.K.
Collection of Baseline Data			\$15,000	GVEP Secretariat, U.K.
Consultation with the Rural Electrification Working Group	2	2,000	\$4,000	GVEP Secretariat, U.K.
Secretariat Computers	2	1,500	\$3,000	GVEP Secretariat, U.K.
Secretariat Printer	1	1,000	\$1,000	GVEP Secretariat, U.K.
GVEP Sri Lanka Home Page	1	2,000	\$2,000	GVEP Secretariat, U.K.
Internet Connection	12 Months	30	\$360	GVEP Secretariat, U.K.
Drafting and Finalizing the National GVEP Action Plan			\$4,000	GVEP Secretariat, U.K.
<b>Total</b>			<b>\$75,560</b>	GVEP Secretariat, U.K.
<b>Contingency</b>		<b>10%</b>	<b>\$7,556</b>	GVEP Secretariat, U.K.
<b>GRAND TOTAL</b>			<b>83,116</b>	GVEP Secretariat, U.K.

## ANNEX II: LIST OF PARTICIPANTS

### Technical Consultation

#### Establishing the GVEP Working Group in Zambia and Planning for the National GVEP Action Plan

Intercontinental Hotel, Lusaka, Zambia

List of Participants

**ZAMBIA GVEP – WORKING GROUP TECHNICAL CONSULTATION MEETING**

**Lusaka – Zambia: October 27, 2004**

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## **ANNEX III: GVEP WORKING GROUP SUBCOMMITTEES: ACTIVITIES, AND MEMBERSHIP**

### **A. SUBCOMMITTEE 1 (SC 1) – RURAL ENERGY POLICY DEVELOPMENT**

#### **1. Activities of SC 1**

The Rural Energy Policy Development Subcommittee will assist the GVEP Working Group (WG) in:

- The preparation of discussion papers that identify the rural energy policy related issues, on which public comment will be sought
- Identifying weaknesses in the existing energy sector policies, regulations, and laws
- Identifying best approaches and examples to ensuring the development and implementation of a comprehensive rural energy policy in Zambia
- The analysis of submissions made in response to discussion papers
- The analysis of other materials relevant to the development of the rural energy policy
- The preparation of the draft of the rural energy policy for Zambia

#### **2. Membership of SC 1**

The proposed membership of SC 1 is the following:

Mr./Ms. \_\_\_\_\_ *Chairperson*  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_

### **B. SUBCOMMITTEE 2 (SC 2) – FINANCE & PRIVATE SECTOR**

#### **1. Activities of SC 2**

The Finance & Private Sector Subcommittee will assist the GVEP WG in:

- Review of existing financing arrangements
- Review the role of the government
- Review the role of the donors
- Review the role of the private sector
- Assess cost recovery Issues
- Explore possibilities for public private partnerships
- Recommend incentives that can attract increased funding for rural energy

#### **2. Membership of SC 2**

The proposed membership of SC 2 is the following:

Mr./Ms. \_\_\_\_\_ *Chairperson*  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_

## C. SUBCOMMITTEE 3 (SC 3) – TECHNICAL ISSUES

### 1. Activities of SC 3

The Technical Issues Subcommittee will assist the GVEP WG in areas such as:

- Energy demand (Household and Productive/Commercial use)
- Affordability
- Income generation
- Grid extension
- PV systems
- Wind
- Biomass
- Mini/micro hydro (isolated systems)
- Hybrid systems
- Geothermal
- Thermal (e.g. coal)

### 2. Membership of SC 3

The proposed membership of SC 3 is the following:

Mr./Ms. \_\_\_\_\_ Chairperson  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_

## D. SUBCOMMITTEE 4 (SC 4) – OUTREACH AND INFORMATION

### 1. Activities of SC 4

The Outreach and Information Subcommittee will assist the GVEP WG in:

- The preparation of mass media to disseminate the findings, reports and work of the other subcommittees
- The preparation of outreach plans to involve stakeholders in all aspects of rural energy initiatives
- To provide a forum for stakeholders to express rural energy concerns
- The convening of national, regional and local outreach programs
- The transfer of Zambia experience to the GVEP secretariat
- To monitor and obtain the lessons learned and other valuable information from other countries experiences through the GVEP secretariat

### 2. Membership of SC 4

The proposed membership of SC 4 is the following:

Mr./Ms. \_\_\_\_\_ Chairperson  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_  
Mr./Ms. \_\_\_\_\_

## ANNEX IV: INITIAL ACTION PLAN FOR GVEP ACTIVITIES IN ZAMBIA

### INITIAL ACTION PLAN FOR GVEP ACTIVITIES IN ZAMBIA (Immediate and Mid-Term Milestones and Actions)

Area of GVEP Service	Objective / Targets	Activities	Responsible Institution	Expected Start / Completion Date
1. Action plan development	Development and approval of a National Action Plan to launch GVEP activities	<ul style="list-style-type: none"> <li>Identification and engagement of an exemplary institution with development expertise and access to stakeholders to serve as lead on national action plan development and project facilitation</li> </ul>	DOE	Commenced early 2004
		<ul style="list-style-type: none"> <li>Conducting a preliminary baseline survey of the current actors and activities in the energy sector and the donor priorities. This will include gathering information on energy related activities set forth in the Poverty Reduction Strategy Paper, the Transitional National Development Plan, Rural Electrification policy and other energy related plans that may already be in place or are under development in Zambia</li> </ul>	DOE	Completed by end June, 2004
		<ul style="list-style-type: none"> <li>Establish the National GVEP Technical Secretariat (GVEP TS) housed at the DOE</li> </ul>	DOE	Established in June 2003
		<ul style="list-style-type: none"> <li>Synthesize information and develop a background paper that describes the status of past and current programs and priorities related to the GVEP objectives. This includes rural energy programs and priorities; policies; rural energy service delivery mechanisms; linkages between energy and rural poverty alleviation; barriers to the delivery of modern energy services; and on-going and planned donor activities</li> </ul>	DOE/GVEPTS	underway
		<ul style="list-style-type: none"> <li>Plan and develop a framework for national consultations to be conducted with a range of stakeholders drawn from health, education, agriculture, transport and enterprise sectors</li> </ul>	DOE/GVEPTS	Completed January 2005

Area of GVEP Service	Objective / Targets	Activities	Responsible Institution	Expected Start / Completion Date
		<ul style="list-style-type: none"> <li>Convene a multi-sectoral stakeholder dialogue on how the provision of modern energy services to non-energy sectors such as health, education, agriculture, transport, and enterprise could help reduce poverty and enhance development</li> <li>Gather and synthesize inputs from multi-sectoral stakeholder dialogue to develop a GVEP national action plan for energy and poverty reduction.</li> <li>GVEP WG to finalize the Draft Action Plan and submit it to the GRZ and donors for approval and support</li> </ul>	DOE/GVEPTS  DOE/GVEPTS/ GVEPWG  DOE/GVEPTS/G VEPWG	Completed by end March, 2005  Completed by end March, 2005  Completed by May, 2005
<b>2.1 Capacity development</b> Assessment of institutional capabilities and available training materials on rural energy and development, with a focus on cross-sectoral approaches	Background study of existing training material, institutions and facilities	<ul style="list-style-type: none"> <li>Commission a background paper that outlines the existing training tools on energy and development, with a particular focus on assessing the quality and relevance to GVEP services.</li> <li>Make recommendations on new training kits and tools that would be useful to develop for GVEP training activities</li> <li>Assess the need for establishing a local institution at the national level to take over the activities under "capacity building" service of the GVEP</li> </ul>	DOE/GVEPWG  DOE/GVEP WG  GVEP TS / GVEP WG	Completed by May, 2005  Completed by June 2005  Completed by June 2005.
<b>2.2 Capacity development</b> Broad-based agreement and commitment to a GVEP capacity development strategy that will help facilitate implementation at the national level	GVEP capacity development strategy	<ul style="list-style-type: none"> <li>Identify the capacity development needs, priorities and ongoing activities in Zambia with GVEP facilitators and in-country partners</li> <li>Develop a strategy and timeline for a comprehensive GVEP training initiative that is linked to other services being provided by GVEP</li> <li>Solicit input and feedback from GVEP Technical Secretariat and partners on capacity development strategy and finalize output</li> </ul>	GVEP TS/ GVEP WG  GVEPTS/ GVEP WG  DOE	Completed by end, 2004  Completed by end 2004  Completed by end 2004



Area of GVEP Service	Objective / Targets	Activities	Responsible Institution	Expected Start / Completion Date
<b>2.3 Capacity development</b> Strengthened capacity to implement the National Action Plan that will help create an enabling framework for rural energy development in Zambia	Design parameters and list of priority topics for a GVEP training workshop in Zambia	• Design a workshop targeted at key issues and options for energy and poverty reduction	DOE/GVEP TS/GVEPWG	Begin by January, 2005
		• Identify and contract institution from within the country to lead the training activity	DOE/GVEP TS/GVEPWG	Completed by March, 2005.
		• Identify speakers and participants that are drawn from government, NGOs, and the private sector	DOE/GVEP TS/GVEPEG	Completed by March, 2005
		• Convene training, summarize the outcomes, and share finding via the National GVEP TS through GVEP knowledge gateway	DOE/GVEP TS/GVEPWG	Start by April, 2005.
<b>3.1 Financing Facilitation</b> Increased awareness of financing tools and services that are currently available and appropriate for rural energy development	Inventory of tools and services to facilitate the development of energy enterprises	• Inventory and evaluate existing financing facilitation tools and services, provided by private and public sector, with a focus on identifying entry points for energy entrepreneurs and consumers	DOE/GVEPTS/MFNP/GVEPWG	Start by April, 2005
		• Share findings through the GVEP Knowledge gateway	DOE/GVEP TS/GVEPWG	Start by April, 2005
<b>3.2: Financing Facilitation</b> Enhanced understanding of possible approaches to consumer credit for rural energy development that would be applicable to Zambia	Analysis of potential consumer credit models that could be applicable to rural energy services delivery	• Commission a study, which reviews various approaches from the energy and non-energy sectors that are used to provide affordable credit to people living in rural areas	DOE/GVEPTS/MFNP/GVEPWG	Start by May, 2005
		• Identify and contract institution to conduct study in coordination with GVEP partners	GVEPTS/GVEPWG	Start by May, 2005
		• Contract institution for editing and layout of publication, including printing of 2,000 copies	GVEP TS	Completed by July, 2005.
		• Share findings through the GVEP Knowledge gateway	GVEP TS	Start by June, 2005
<b>4.1 Knowledge</b>	Energy project	• Develop a systematic approach to query energy projects	DOE/GVEP TS/	Start by January,

Area of GVEP Service	Objective / Targets	Activities	Responsible Institution	Expected Start / Completion Date
<b>Management</b> Enhanced linkages and exchange of information to enhance the National Action Plan Implementation and improved information on development impacts of the included in project profiles	profiles that reflect development impacts more explicitly. Energy project profiles included in GVEP database. Plan established for the development of thematic case studies publications	<p>to gather relevant project information that will be integrated into project profiles</p> <ul style="list-style-type: none"> <li>Refine the approach to data collection, define data gaps, and assist with data gathering and input</li> <li>Facilitate enhancement of energy project profiles to capture development impacts at the local level including information on community involvement, financing mechanisms, role of women, livelihoods, barriers, and other issues relevant to partnership development with GVEP</li> <li>Develop project profiles in coordination with GVEP Technical Secretariat and incorporate project profiles in the GVEP website</li> </ul>	<p>/REA</p> <p>DOE/GVEP TS/ REA</p> <p>DOE/GVEP TS/ REA/</p> <p>DOE/GVEP TS</p>	<p>2005</p> <p>Completed by March, 2005</p> <p>Start by March, 2005</p> <p>Start by March, 2005.</p>
<b>4.2 Knowledge Management</b> Increased awareness of energy projects at the country-level by a broad, multi-sectoral set of actors	Information on energy projects posted in the National GVEP TS website and linked on GVEP website	<ul style="list-style-type: none"> <li>Establish systematic approach to gather information on Government/Donor energy projects</li> <li>Compile and synthesize information and put in a format that is compatible with the GVEP database</li> <li>Post information in the Zambian GVEP TS website and submit information to GVEP webmaster for inclusion in the GVEP worldwide website</li> <li>Provide follow-up monitoring of the website needs</li> </ul>	<p>DOE/GVEP TS/ REA/</p> <p>DOE/GVEP TS</p> <p>DOE/GVEP TS</p> <p>DOE/GVEP TS</p>	<p>Start by March, 2005</p> <p>Start by March, 2005</p> <p>Start by March, 2005</p> <p>Continuously</p>
<b>4.3 Knowledge Management</b> Improved participation in information sharing and discussions	Participate in the GVEP network information sharing and discussion	<ul style="list-style-type: none"> <li>Identify efficient ways to share information</li> <li>Assist in providing substantive information on sustainable energy programs and projects</li> <li>Facilitate participation as needed in online discussion group related to GVEP</li> </ul>	<p>DOE/GVEP TS/</p> <p>DOE/GVEP TS/ REA</p> <p>DOE/GVEP TS</p>	<p>Start by March, 2005</p> <p>Start by March, 2005</p> <p>Start by end 2004</p>

Area of GVEP Service	Objective / Targets	Activities	Responsible Institution	Expected Start / Completion Date
<b>5.1: Monitoring and Evaluation</b> Improved understanding of the various design options for a monitoring and evaluation framework	Monitoring and evaluation framework for GVEP services	<ul style="list-style-type: none"> <li>Commission a desk study of methodologies that are being used to collect baseline data and the types of performance indicators that would be appropriate for GVEP activities.</li> <li>Identify and contract institution to conduct study in coordination with GVEP Technical Secretariat</li> <li>Share findings on status of partnership with GVEP partners</li> <li>Study results posted on GVEP website</li> </ul>	DOE/GVEPTS/	Start by June 2005
			DOE/GVEPTS	Completed by June, 2005
			DOE/GVEPTS	Start by June, 2005
			GVEPTS	Start by June, 2005

**MFNP:** Ministry of Finance and National Planning

**DOE:** Department of Energy

**GVEP:** Global Village Energy Partnership

**GVEP TS:** GVEP Technical Secretariat

**GVEP WG:** GVEP Working Group

**REA:** Rural Electrification Authority April 2005

## **ANNEX V: PRELIMINARY SMALL HYDRO RESOURCE ASSESSMENT, ZAMBIA**

### **SMALL-SCALE HYDROPOWER RESOURCE ASSESSMENT IN ZAMBIA OCTOBER, 2004**

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## **1.0 Background**

Enhancing the energy service delivery for poverty alleviation and sustainable development is one of Government of the Republic of Zambia's (GRZ) highest priorities. In Zambia over 70% of the population is described as poor. Most of these people depend strongly on traditional fuels to meet their daily energy needs and access to affordable electricity and modern sources of energy remains a developmental challenge. Lack of financial resources is a major obstacle to most of the Zambians for accessing alternative energy sources.

In order to reduce poverty the Government of the Republic of Zambia (GRZ) and other stakeholders recognize the need for a better integration of energy services in the country's rural development plans and programmes. These programmes are highlighted in the Transition National Development Plan (TNDP) and the Poverty Reduction Strategy Paper (PRSP).

To achieve the goals set in the PRSP and the TNDP for the energy sector, among other initiatives, GRZ has committed itself to participate and use the Global Village Energy Partnership (GVEP) as a relevant initiative. The GVEP seeks to create a 10-year program to reduce poverty and enhance sustainable development through the accelerated provision of modern energy services to those un-served or underserved. In response to its participation in GVEP, the GRZ has established a GVEP Working Group consisting of 16 members representing the main poverty reduction stakeholders and a GVEP Technical Secretariat in the Ministry of Energy and Water Development (MEWD). Having established the structure and responsibilities of the GVEP Working Group, a National Action Plan for Energy Delivery Services in the GVEP context was drawn up in June, 2004. The Action Plan provides practical directions for the immediate and mid-term milestones and actions towards implementation of the policies and projects for delivery of energy.

Among the various options available to increase the levels of access to electricity by rural population is the development of the small-scale hydro potential. Zambia possesses significant small-scale hydropower resources in addition to its very significant larger scale hydropower resources. The small-scale hydropower developments can be valuable for isolated, small, rural electricity grids and for improving electricity quality in the remote parts of the national electricity distribution grid. For sound planning of the use of Zambia's small-scale hydropower resources it is necessary for the Government of Zambia to quantify these resources.

It is known that Zambia possesses significant solar insolation and that successful solar home systems are being used in rural Zambia. The resource information to design solar systems is currently adequate, unlike that for small-scale hydropower resources. This report therefore highlights basic criteria which would assist the Department of Energy in the development of the small-scale hydropower resources assessment.

## 2.0 Objective

The objective of this report is to provide initial information in designing a plan to assess small-scale hydro resources at national level.

## 3.0 Country Information

Zambia covers an area of 752,000km<sup>2</sup> with a population of 10.3 million people. The country is landlocked and situated between latitude 8° S and 18° S; longitude 22° E to 33.5° E. The main rivers include Zambezi, Kafue, Luapula, Kabombo, Luangwa and Chambeshi.

The generation capacity in Zambia is nearly 100% hydro. The main power stations are constructed on the Zambezi and Kafue Rivers in southern part of the country while the major load centre, taking up more than 50% of the electricity demand, is located in the Copperbelt province where the copper mines are situated. The generation capacity in Zambia is dominated by hydropower with an estimated potential of 4,000 MW. The total installed capacity is 1,760 MW out of which 1,670 MW is hydropower and 90 MW is thermal. The hydropower stations supply the grid while the diesel power generating plants supply isolated loads mainly in remote areas not connected to the grid. The Gas Turbines totaling 80MW are located in the Copperbelt province providing standby supply to the mines. The Zambian power system is shown in Figure 1.

Figure 1: Zambian Power System

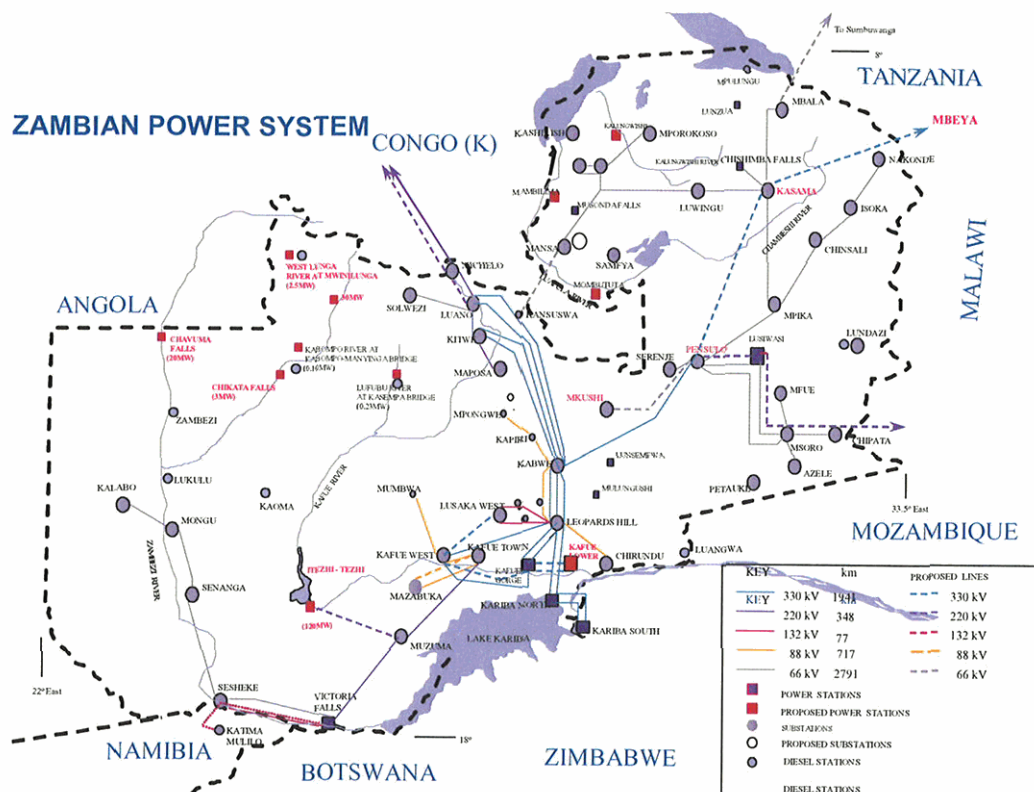


Table 1: Installed electricity generation capacity (ZESCO statistics)

No.	Description	Capacity (MW)	Type
1	Kafue Gorge	900	Hydro
2	Kariba North Bank	600	Hydro
3	Victoria Falls	108	Hydro
4	Lunsemfwa & Mulungushi	38	Hydro
5	Small Hydros	24	Hydro
6	Isolated Generation	10	Diesel
7	Gas Turbine (stand by)	80	Gas
	Total installed capacity	1760	

#### 4.0 Large Scale Hydroelectric Potential

The potential for hydro power generation in Zambia has long been recognised and feasibility studies exist for many hydro sites. The table below summarises the major hydropower projects in Zambia.

**Table 2: Large scale hydroelectric potential in Zambia**

No.	Description	Capacity (MW)	Cost (US\$ ) million	Cost per Unit of Capacity (\$/kW)
1	Itezhi-tezhi	120	82	683
2	Kariba North Extension	300	225	750
3	Kafue Gorge Lower	600	600	938
4	Batoka Gorge	800	920	1,150
5	Kalungwishi River	163	376	1,679
6	Devil's Gorge	800	1,655	2,069
7	Lusiwasi Extension	40	92	2,300
8	Mpata Gorge	320	839	2,622
9	Lupaula River	850	2,500	2,942
	<b>TOTAL</b>	<b>3,993</b>	<b>7,289</b>	

#### 5.0 Small-Scale Hydropower potential

In addition to large-scale hydro-electric potential, which is sufficient to meet the growing demand in the interconnected system for several years, Zambia also has a number of potential sites on smaller rivers suitable for local small-scale power generation. The most advantageous places for such development are in the North-Western and the Northern provinces which exhibit good topography of the terrain, the geology of the



ground, the highest rainfall figures in the country and the lowest evaporation due to temperatures which are below average.

In Zambia, the isolated rural load centers are normally supplied by diesel generators. In order to promote rural electrification and to replace the costly diesel power generation, efforts have been made to identify suitable sites for small-scale hydropower schemes. One such development is the effort by government to develop the Mini-hydropower potential in North-Western Province aimed at replacing the costly diesel generation in which a pre-feasibility study was undertaken.

The Zambian climate is characterized by the cycle of dry and wet seasons. During the dry season from April to November many small rivers dry up, whereas during the rainy period the rivers flood. Large variations in river discharges are thus typical of Zambian rivers.

In view of the above, suitable sites have to be identified by collecting information on rivers with sufficient year-round flows. Since the regulation of river flows by dams and water storage requires high initial costs and often makes small-scale hydropower projects uneconomical, preference is given to sites that can sustain run-of-river schemes. Apart from low cost, other benefits of run-of-river schemes include, fast and easy construction, easy flood protection, minimal environmental impact and low evaporation losses. Some of the identified small-scale hydropower sites are described below:

**Table 3: Small-scale hydro potential**

No.	River Basin	Site	RIVER	Capacity (kW)
1	Zambezi	Zambezi falls	Zambezi	
2	Zambezi	Chavuma falls	Zambezi	10-20,000
3	Zambezi	Sachibondo	Luakela	600
4	Zambezi	Mwinilunga	West Lunga	2,500
5	Zambezi	Kapembe	Kabompo	
6	Zambezi	Chikata falls	Kabompo	3,000
7	Kafue	Kasempa	Lufupa	230
8	Kafue	Mutanda	Lunga	400
9	Kafue	Kelongwa	Lunga	
10	Chambeshi	Chandaweyaya	Chambeshi	
11	Chambeshi	Mbesuma ferry	Chambeshi	
12	Chambeshi	Shiwang'andu	Manshya	1,000

Source: UNIDO/GEF Project Brief

In order to appreciate the full potential of small scale hydropower resource in Zambia, a comprehensive hydropower resource assessment will be required at a national level.

## **6.0 Electricity Access**

The estimated electricity access in Zambia is 20%. The access by the rural population to electricity in rural areas is as low as 2%. Among other reasons, the low electricity access level can be attributed to the high cost of electricity infrastructure and equipment. This problem has been compounded by low population density in Zambia and enormous distances between major towns or load centers.

## **7.0 Electricity Sub-sector Policy**

The National Energy Policy (NEP) of 1994 is the main energy policy document dictating the changes and developments in the energy sector. The policy document contains measures for each energy sub-sector, outlines strategies for implementation, and identifies the legal framework needed to implement the policy. It establishes an appropriate regulatory framework to protect consumer interest, investors, and the environment. Its main objective is "to promote optimum supply and utilization of energy, especially indigenous forms, to facilitate the socio-economic development of the country and maintenance of a safe and healthy environment".

In the electricity sub-sector the policy supports measures aimed at increasing accessibility and developing the most cost effective hydropower sites for domestic and export market. To achieve this goal, the policy highlights measures hinged on:

- i. Restructuring of the electricity industry in order to improve service delivery.
- ii. Improving accessibility to electricity
- iii. Promoting electrification of productive areas and social institutions
- iv. Developing the hydro-potential to take advantage of the strategic location of the country in the sub-region
- v. Reviewing the existing legislation on electricity in order to bring it into conformity with the new macro-economic environment.

Currently, the Ministry of Energy and Water Development is in the process of reviewing the 1994 National Energy Policy.

## **8.0 Methodology for Assessing the Small-Scale Hydropower Potential**

Zambia is endowed with a large water resource as evidenced by the large hydropower potential mainly on the Zambezi, Kafue, Luapula and Kalungwishi rivers. This potential is well documented in various feasibility studies which have been undertaken as part of the national generation development plans meeting the local demand and for export to the sub-region. These potential sites are given in Figure 2.

However, what has not been appraised fully and documented is the small-scale hydropower potential for rural electrification. To assess this potential a methodology for realizing this potential is proposed.

### **8.1 Reconnaissance study**

In order to appreciate the national small-scale hydropower potential one needs to undertake a preliminary (reconnaissance) study at a national level. The reconnaissance is the initial stage study in which 1:50,000 to 1: 100,000 scale topographical maps are used. The potential sites are screened and evaluated against factors which include but not limited to: river flows; hydrology; meteorology; geology; power demand and supply, and environmental issues.

### **8.2 Hydropower potential**

The hydropower potential is the amount of potential energy which exists in a river or area. A hydropower potential study is done to investigate the potential and is conducted with a view of:

- Maximizing the available river head as much as possible taking into account the existing technology and economic factors of the development.
- Selecting a power generation method which is suitable for the local conditions which may be determined by river topography and stream flow conditions.
- Optimally locating the reservoirs and pondages so as to maximize energy generation as much as possible by utilizing the river flow effectively.

A plan is consequently made for each site for which the reconnaissance study has been carried out.

### **8.3 River basin master plan**

In the event that several possible developments in a river basin are considered, a river master plan should be developed before conducting a feasibility study. The hydropower potential survey is conducted to take inventory of the potential energy existing in the river. On the other hand, the master plan study is conducted to develop a river basin most effectively and to optimally dimension the projects. Then priority is given to each project considering the project economics, access road, transmission line, demand and other factors. Key projects which rank highly and contribute significantly to the basin development may be implemented first.

### **8.4 Feasibility study**

The feasibility study is the final stage to determine the realization of the project in which 1:5,000 scale topographical maps are used. It is recommended that the planning process is carried out in three main stages namely; preparatory investigation, reconnaissance and feasibility. The preparatory stage involves general information gathering from maps, river flows, hydrology, meteorology, geology, power demand, supply environmental considerations, population distribution, similar projects etc. This information can be obtained from responsible institutions and Ministries such as Ministry of Lands, Department of Meteorology, ZESCO, Central Statistics Office, Environmental Council of Zambia, etc.

The above information is used in the reconnaissance stage to determine possible hydropower sites in the country. The possible sites are pinpointed and more detailed information is collected and where possible site visits are undertaken. Once sufficient site information is collected and analyzed preliminary design, construction estimates, economic assessment are then executed. If found to be viable, the site can be

subjected to further work which may include but not limited to topological, geological, environmental, demand and supply investigations. These sites are then included in a development plan and if several sites are located in the same river basin a river basin master plan can be developed. The sites from the development plan or river basin plan can then be selected according to their ranking for full feasibility investigation. The flowchart of the process is shown Figure 2.

## **9.0 Preparatory Investigations**

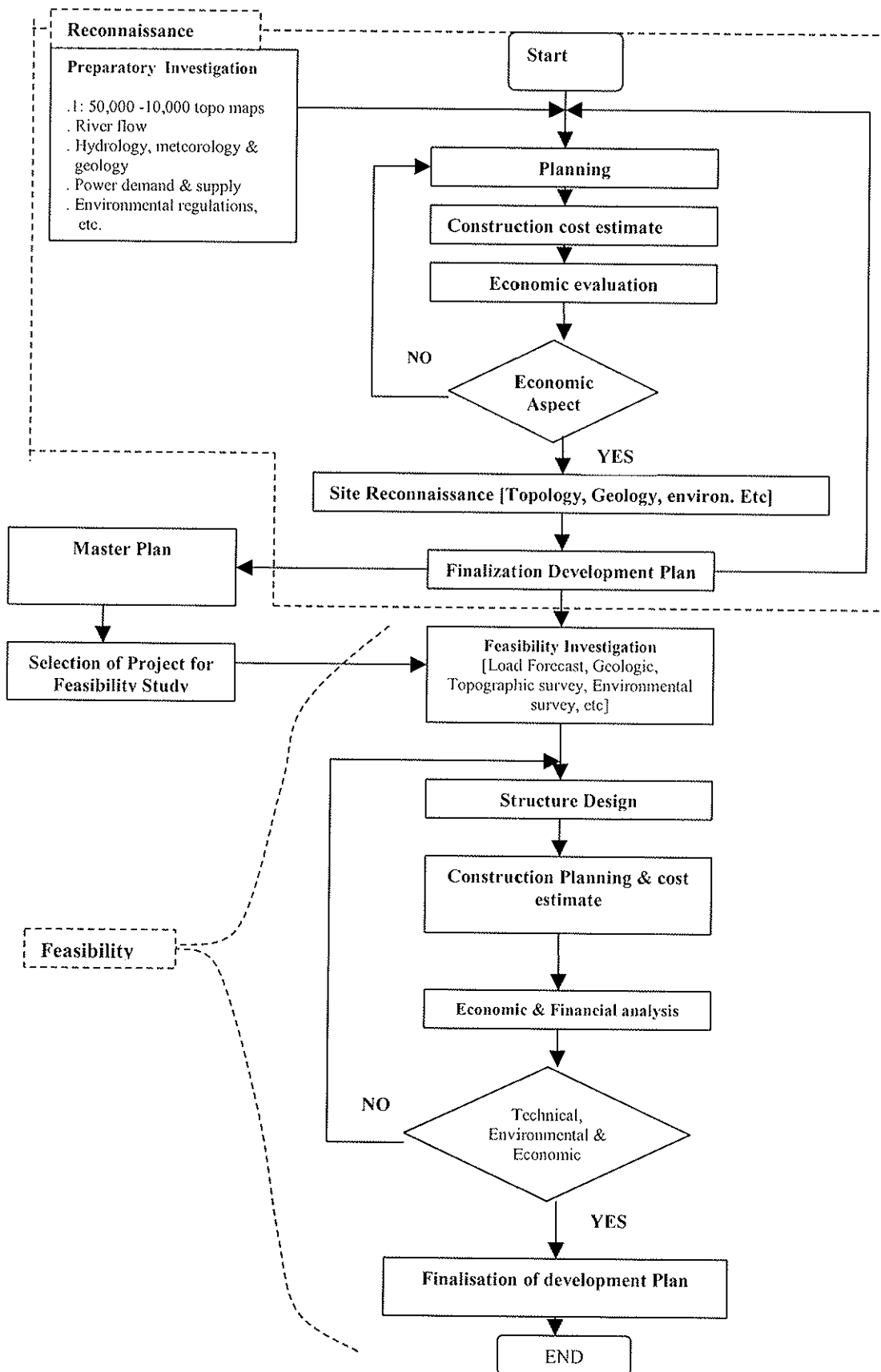
### **9.1 Data collection**

The initial stage study of hydropower is called the reconnaissance. The minimum data required in this stage are topographic maps and run-off data. Other data on hydrology, meteorology and geology are desirable for investigations.

### **9.2 Topographic maps**

Plant discharge of hydro power plant is determined by river flow available at the site. The catchment area is necessary for calculation of the river flow. The head is determined by the difference in elevation between the intake site and tailrace site. The topographic maps are required to compute the catchment area and the head. Generally 1:50,000 to 1:100,000 scale topographic maps are used.

## **Figure 2: Assessment of Small Scale Hydropower Potential**



### 9.3 Run-off data

Together with the topographic maps described above, the most important data for drawing up a hydro power development plan is run-off data. In many cases, stream-flow gauging and custody of data are conducted by the organization which will ultimately implement the hydro power project. If river flow is not recorded in the project site or nearby, it is necessary to prepare run-off data of the project site using data available, including run-off data of adjacent rivers.

#### ***9.4 Other hydrological and metrological data***

Normally, rainfall is observed even where runoff is not recorded. If the period of the recorded data is too short and inadequate for the reconnaissance study, rainfall data is used to prepare long-term run-off data. If a stream flow gaging is not installed near the project site but in other basins, run-off data can be prepared from the data of the other basins taking into consideration rainfall of both basins. If no run-off data is available in the nearby basin, run-off data must be produced from the rainfall data. In the case of a plan for a large reservoir, data concerning evaporation should be collected.

#### ***9.5 Geologic data***

It is desirable in the planning stage to know the geologic condition of the basin and waterway route. If data concerning seismic activity in the project site is available, that data should also be collected.

#### ***9.6 Data concerning power demand, power supply and transmission lines***

Daily load curve of the maximum load day in the supply area and the sources of power supply are investigated. For developments in new areas where there has been no supply a more detailed survey for potential loads should be investigated. Peak duration hours required for planning of reservoir and pondage type can be assumed by a daily load curve.

In many cases the hydro power plants are located near the load centre and the therefore the percentage of the transmission line cost in the hydro power generation cost is high.

#### ***9.7 Other data related to the project planning***

Data available for previous studies or projects in the nearby areas should be collected and can be useful for project planning.

#### ***9.8 Master plan of river basin development***

The master plan is prepared for development of the entire river basin in a most effective and efficient manner. If a master plan is available, consideration must be given so that other competing water needs are not negatively affected.

#### ***9.9 Environmental regulations***

Any hydropower development should comply with the environmental legislation and guidelines in Zambia hence the need for the Environmental Impact Assessment (EIA). This need was established within the Zambia under the 'Environmental Protection and Pollution Control Act.

### **9.10 Data concerning construction costs**

Estimate of the construction cost is necessary to evaluate the economic viability of the project. The unit prices of the principal inputs such as concrete, excavation, labor and interest rates are useful for the estimation of the construction cost. This data must be collected.

### **9.11 River investigation by maps**

As hydro power plants use river water, the river conditions must be investigated in project planning to take into account other competing needs which include water for drinking, irrigation, industry, fishery and transport.

### **9.12 Study of river profile**

Hydro power plants generate electricity by using the difference in elevation of a river. The river's gradient is studied by topographic maps so that the topographic features can be used most effectively. The maximum output is the power output the plant can generate, normally referred to as installed capacity or rated capacity. The maximum plant discharge is the largest discharge used by the power plant which is the value used to determine the installed capacity.

## **10.0 Existing Projects and Initiatives**

A few programmes and initiatives exist aimed at developing the small scale hydropower potential in Zambia. Some of these initiatives are:

- **Small-Scale hydropower development in Zambia:** A pre-investment study of the small-scale hydropower potential in North-western Province was carried in 2000. The main objective of the study was to assess the development of the small scale hydro potential to supplant the costly diesel generation currently supplying the towns not connected to the national electricity grid. The costs of running these diesel engines are prohibitive due to high fuel costs and aging machinery. Although the cost of generation by diesel in these areas is about ten times the average national tariff, the customers pay the same national tariff. The study recommended a combination of small hydropower developments, isolated grids and national grid extension in order to replace the diesel stations. The study recommended the development of two sites; West Lunga (2.5MW) and Chikata Falls (3MW). See Fig 1. Efforts to develop these sites are currently being pursued.
- **UNIDO/GEF project:** The thrust of this project is on Renewable Energy Based Electricity Generation for isolated mini-grids which includes the promotion of mini-hydro units, solar energy services, and biomass. The pilot projects being undertaken include:
  - A 1,000kW mini-hydro business model in Shiwang'andu.
  - A 1,000 kW biomass gasification business model in Kaputa District; and
  - A 36 kW PV business model at Chinsanka in Samfya.



The above projects are intended to increase access to modern energy services. This initiative is currently being promoted.

- **Increased Access to Energy Services (IAES):** One of the major programs being jointly developed by the GRZ and the World Bank is the "*Increased Access to Energy Services (IAES)*" program. This program is being designed following the concept that the benefits of rural electrification can be significantly increased by working with other sectors (such as health, and education), so that services in these sectors can also be improved once electricity and information and communication technologies (ICTs) become available. The major program components include; technical assistance, capacity building, and most importantly, co-financing in investment projects. The investment projects would be in the areas of:
  - Electricity, for (i) distribution grid extensions, (ii) independent grid supply using Renewable Energy Technologies (RET) such as small and mini hydropower, and (iii) small solar PV systems; and
  - ICTs (telephony and connectivity), for (i) extension of basic telephony, (ii) extension of Internet to district headquarters, and (iii) extension of ICTs to selected rural institutions.

This project is scheduled to be negotiated in the next 1-2 years.

## **11.0 Capacity Building and Resource Requirements**

The Department of Energy (DOE) must have the basic physical and human resources needed to effectively perform its responsibilities and undertake the assessment of the small-scale hydropower potential in Zambia in the short term and in the longer term to deal with future requirements. The resources needed include financial, physical and human.

### **11.1 Financial resources**

DOE requires adequate funding for efficient operations and capacity building. Firstly, a detailed program of activities required to undertake the assessment should be developed before the financial resource requirements can be estimated.

### **11.2 Physical resources**

DOE must have logistical and basic office resources which would help it operate more effectively. The process of small-scale hydropower assessment requires a lot of site visits and data collection. Once collected, the information will need to be analyzed, processed and packaged. To undertake these tasks the following logistical and physical resources may be required:

- Appropriate office space and furniture
- Adequate Transport (vehicles)
- Good communication facilities (telephone, fax, e-mail, etc)
- Computers

- Analysis tools e.g. software such as PSS/E for Power System Analysis, Hydrological Studies software, Microsoft Project, etc.

### **11.3 Human resources**

DOE must have appropriate staff with skills in technical, economic, financial, power system planning, social and environmental impact assessment. Where skills are lacking DOE may decide to hire new staff, second staff from other Government Institutions, train existing and new staff or use outside consultants for specialized tasks.

### **12.0 Recommendations**

It is recommended that a detailed assessment of the small-scale hydropower potential is undertaken at a national level in order to appreciate the full potential of the resource. In doing so, information and experiences gained from other similar projects in Zambia should be taken into consideration as inputs to the proposed assessment study. The results from the small scale hydropower assessment will provide valuable input into the development of the Rural Electrification Master Plan in Zambia.

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## **ANNEX VI: RURAL POVERTY REDUCTION INTERVENTION PAPER**

### **RURAL POVERTY REDUCTION INTERVENTIONS IN ZAMBIA**

**Sponsored Under**

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**Prepared  
By**

**CORE International, Inc.  
Washington, D.C.**



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## ACRONYMS/ABBREVIATIONS

DoE	Department of Energy
ERB	Energy Regulation Board
ESCO	Energy Services Company
GRZ	Government of the Republic of Zambia
GVEP	Global Village Energy Partnership
Ha	Hectares
kW	Kilowatts
kWp	Kilowatts peak
MoF	Ministry of Finance
m/s	meters per Second
MW	Megawatts
MEWD	Ministry of Energy and Water Development
NEP	National Energy Policy
NRSE	New and Renewable Sources of Energy
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Paper
PV	Photovoltaic
PV-SHS	Photovoltaic Solar Home System
REA	Rural Electrification Authority
REF	Rural Electrification Fund
WG	Working Group
ZESCO	Zambia Electric Supply Company

## 1. Introduction

Zambia is a country rife with poverty despite a richness of natural resources. Despite excess capacity to produce electricity, less than 20% of the country has access to electricity and less than 2% of rural households have electricity. When viewed from a per capita consumption of electricity perspective, Zambia's use of electricity appears high when compared to countries with similar economies. This masks the nature of the Zambian economy, which is built upon energy intensive extractive industries and which exports large volumes of electricity. If statistics for Zambian household consumption were readily available, they would demonstrate that Zambians use very little non-commercial electricity and have very slight consumption of other forms of commercial energy.

The purpose of this paper is to present the rural poverty energy issues and the process by which interventions could be addressed.

## 2. Background

Zambia's situation is challenging. During much of the 1960's per capita income was over \$600 (USD). Today, the population is relatively poor and getting poorer. In 2003, per capita GNI was \$380 (USD) compared to the low income country average of \$450<sup>2</sup>. The vast majority of Zambia's rural poor are at or below the subsistence level of \$1 a day. In 1991, 69.7% of the population was determined to be unable to sufficiently feed themselves. By 1997 this figure had risen to 73%<sup>3</sup>. In 1998 it was estimated that 83% of Zambia's rural population was in poverty, with 70.9% experiencing extreme poverty. No matter the measure of poverty, whether it be income or another metric (such as the Human Development Index), Zambia's rural population is poor. Population is also sparse, with approximately 14 persons per square kilometer, including urban areas.

*"In summary, the worsening poverty trend in Zambia is primarily a product of:*

- Lack of economic growth while the population has more than trebled since independence.*
- Inadequate or inappropriate targeting of the poor and vulnerable people as evidenced by inappropriate budgetary locative patterns that have generally biased resources against pro-poor interventions.*
- Weak integration of the poor, particularly small-scale farmers, into the market.*
- Absence of well-conceived livelihood approaches that address rural and urban poverty.*
- Poor people's weak access to real assets due to unfavorable land ownership laws and unsupportive land tenure systems that have worsened labor and land productivity.*

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<sup>2</sup> World Bank, World Development Indicators, 2004

<sup>3</sup> Zambia's Poverty Reduction Strategy Paper, page 22

- Weaknesses in governance in both its economic and political dimensions.

*Little can be achieved to reduce poverty unless measures are taken to revive Zambia's economy."*<sup>4</sup>

So who are Zambia's rural poor? In most areas they are farmers or those engaged in some form of agriculture. Addressing the challenges facing the agricultural sector is the most broad based method of attacking poverty and, as such, "enhanced agricultural productivity is being given the highest priority under this PRSP".

*Zambia has abundant arable agricultural land and supportive agro-ecological zones, which combined with abundant human resource base, can propel increase in output. On equity, it is noted that the poor in Zambia are predominantly in agriculture. If the sector grows and measures are put in place to include the poor in this growth, poverty will be reduced. The creation of conditions that enhance long-term innovative improvement of the productivity of agricultural resources, particularly smallholder farmers' land and labor is, therefore, considered crucial.*

### **3. Rural Economic Activity and Energy**

As mentioned previously, Zambia is a paradox for having extreme poverty. The country's soil and weather conditions are favorable to farming. As agriculture is the main source of employment for rural peoples, with the exception of extractive industries in the Copper Belt, it has the potential to be an engine of growth for the Zambian economy. However, major changes are required before this can be accomplished.

Zambian agriculture is characterized by a large number of small farmers with insufficient inputs. Small subsistence farmers make up over 75% of the sector's 600,000 farms. Over 80% of rural households are involved in agriculture. Women heading the households are particularly hard hit and form the poorest of the farm sector.

Human energy is the farm economy's backbone with biomass and wood as the other major sources of energy. While these energy sources are often not purchased, they entail a major cost to the household in terms of the time and labor required to gather them. Surveys indicate that rural women spend up to 20% of their productive time collecting firewood. Ninety-nine percent of rural households report using wood. Rich rural families use charcoal for cooking and their urban counterparts use electricity and kerosene. Animal power is emerging in mid-sized farms but is virtually nonexistent in the vast majority of the nation's farms, the small farmers. Commercial farms have varied energy sources. Less than 2% of the rural population has access to electricity.

This lack of energy has profound implications: Zambia has abundant water resources but less than 10 percent, or 40,000 hectares of irrigable land, are irrigated. Similarly, only 14% of arable land is cultivated. "It is clear, therefore, that a technological

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<sup>4</sup> Zambia's Poverty Reduction Strategy Paper



revolution in Zambian agriculture is required in order to achieve two goals: (a) expand the land under cultivation and thereby maximize the advantage of Zambia as a land surplus country; and (b) raise land and labor productivity. The shortages can be overcome in part by increasing farm incomes, by changing the crop mix, or by shifting cropping activating to off-peak seasons (which in turn can only be achieved through irrigation)<sup>5</sup>. All of these improvements require a dramatic increase in energy production and consumption at the farm level in some form whether it be human, animal, mechanical, chemical, or other.

#### **4. Zambia's Energy Resources for Rural Development**

There are two important lessons from international experience that should guide Zambia. First, there is an order based on complex interrelationships such as economics, technology, demand, productive uses and social beliefs that produce a transitioning in energy use, an energy ladder, as it is often called. Consumers rarely move directly from fuel wood to electricity for cooking, for example. This has profound implications to energy planners and care should be taken when setting policy or developing projects to supply the correct form of energy. The current energy situation can be described as bleak. However, just as Zambia has significant agricultural potential, it too has large potential energy resources for rural use. This section presents the available resources and summarizes them.

Second, energy alone does not cause economic development. There is no empirical evidence to conclusively support the claim that providing energy will promote economic development. To be sure, the introduction of more modern forms of energy can substantially increase the quality of life but it is not certain that these translate into economic development. For example, if electrification in a new area provides drinking water where once women walked miles to collect it, this increases their standard of living. However, the impact on economic development depends crucially on what the women do with the time which was freed up from collecting water.

To contribute to economic development, the introduction of energy must be carefully planned to coincide with other factors of production. There must be a productive activity that has been identified and the project must identified the other potential impediments and have ways of addressing them. There are numerous examples of where electricity was supplied so that farmers could irrigate but irrigation failed to take place because there were other constraints, such as access to capital or land tenure.

Together or alone, both of these lessons are of crucial importance to GVEP. Given the low income in rural areas, energy will have to be subsidized for some time. Moreover, given the Government's resources and its commitment to providing energy for economic development, the implications are that the energy sector should work closely with other projects or interventions to insure that an integrated approach to development takes place, and that resources are combined to increase the chances of success and that resources flow to fill critical gaps. In essence this means applying technical and

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<sup>5</sup> Kimhi, Ayal and Chiwele, Dennis, Barriers for Development in Zambia Small and Medium Size Farms: Evidence from Microdata.

financial due diligence to potential projects. Increasing the probability of success a priori means working closely with others, such as the Ministry of Agriculture and other donors and proponents of projects, which are mostly seen as non-energy. For example, if lack of irrigation is the main hurdle to increased economic development in many rural areas, it makes sense then to work closely with those providing irrigation services.

The following section presents the available energy resources and summarizes with a local priority of their deployment in rural interventions.

#### **a. Grid Extension**

Approximately 20% of the urban population and as few as 2% of the 6.2 million rural population have access to electricity. Extension of the grid to provide rural electrification has been hampered by the high unit cost per connection as a result of low population density in Zambia, enormous distances between major towns or load centers, low demand per connection, and the performance of ZESCO. From a social perspective the cost of grid extension projects cannot be justified. Given these electrification constraints, extension of the grid is unlikely to happen in the near future. At this time, a few rural load centers are electrified by diesel generators.

**Off-Grid Technologies:** Renewable Energy (RE) embraces the following: solar (thermal and photovoltaic), small-hydro, biomass (agricultural wastes, forestry waste, industrial/municipal organic wastes, energy crops and animal waste), geothermal and wind. Data is not readily available on the resource potential or the production and consumption of these resources in Zambia. While wood, petroleum and hydropower will continue to be the major energy sources, at least in the mid term, Zambia is potentially rich in these sources of energy. Table 1 summarizes the availability and potentials for the utilization of renewable energy sources and technologies.

**Table 1: Availability and Potentials for Utilization of Renewable of Energy Resources and Technologies in Zambia<sup>6</sup>**

<b>Renewable Energy Source/Technology</b>	<b>Opportunities/Use</b>	<b>Resource Availability</b>	<b>Potential Energy Output</b>
<b><i>PV</i></b>	Thermal, Electricity (water pumping, lighting, refrigeration)	6-8 sunshine hours	5.5 kWh/m <sup>2</sup> /day (modest potential especially for limited irrigation)
<b><i>Wind</i></b>	Electricity, Mechanical (water pumping/milling)	Average 3m/s	Good potential, especially for irrigation
<b><i>Grid extension</i></b>	Electricity	Existing infrastructure	Excess power (approx. 200 MW)

<sup>6</sup> "Opportunities, Barriers and Policy Dialogue Process to Promote the Use of Renewable Energy Technologies (RETs) and Energy Efficiency for Sustainable Development With Particular Reference to Poverty Reduction", Prof. F. D. Yamba, Director, Centre for Energy, Environment and Engineering Zambia Ltd (CEEEZ), March 23, 2004

Renewable Energy Source/Technology	Opportunities/Use	Resource Availability	Potential Energy Output
<b>Micro-hydro</b>		Reasonably extensive	Requires elaboration and quantification
<b>Biomass</b> (combustion and gasification)	Electricity generation	Agro wastes Forest wastes Sawmill wastes	
<b>Biomass</b> (biomethanation)	Electricity generation Heating (cooking)	Animal waste Municipal and Industrial waste Waste water	Potential requires elaborates
<b>Biomass</b> (extraction, processing for transport)	Ethanol for blending with gasoline to replace lead as octane enhancer  Biodiesel for stationary engines	Sugarcane Sweet sorghum Jatropha	15,000 Ha to meet current demand 40,000 – 50,000 Ha
<b>Biomass</b> (for household energy)	Improved charcoal production  Improved biomass stove	Sawmill wastes and indigenous trees from sustainable forest management	Reasonably extensive

### **b. Solar Energy**

One alternative to grid extension is by Photovoltaic Solar Home Systems (PV-SHS) including the Energy Services Companies (ESCOs) approach.

Solar home systems are an increasingly important means of providing lighting in dispersed off-grid areas of developing countries. Over half a million solar home systems are installed in rural areas of the developing world in countries such as the Dominican Republic, Indonesia, Kenya, the Philippines, Sri Lanka and Zimbabwe.

The main components of solar home systems are:

- **Solar cell modules**, converting sunlight to electricity of between 12 and 60 watts in capacity.
- **Lead-acid batteries**, typically car batteries to store the energy collected during periods of sunlight. Deep discharge batteries are preferred but are often too expensive for the poor. Care should be taken in making sure that the environmental impact of batteries is accounted for in project design and implementation.
- **Charge controllers** or *regulators* to manage the electric charge, protect batteries from damage, and show the status of the system.
- **Direct current (DC) appliances**. SHS use generates low voltage and special appliances are often required. Cost can be cut by local assembly of DC fluorescent lamps and controllers/regulators. This is becoming a secondary business for women in countries such as Bangladesh.

This approach is being tested in Zambia. The MEWD has also incorporated the installation of photovoltaic (PV) solar systems in the rural electrification program. This is a technology that has shown great promise in meeting the energy requirements of remote rural areas in other countries. A few parts of Zambia have already started benefiting from installation of PV systems for water pumping, medical refrigeration and lighting under the rural electrification program.

The Zambia PV-ESCO project has been running since 1998. As of October 2002 there were three ESCOs in operation in Eastern Province of Zambia, servicing a total of 400 clients. However, results to date indicate that large subsidies are required to make this a success. This is in large part due to the high cost of solar relative to rural incomes.

"Based on market studies in India, China, Sri Lanka, Zimbabwe, South Africa and Kenya conducted by various international development agencies over the past 5 years, the consensus is that approximately 5% of most rural populations can pay cash for an SHS, 20 to 30% can afford a SHS with short or medium term credit, and another 25% could afford an SHS with long term credit or leasing.<sup>7</sup>" These countries have higher per capita incomes than Zambia so care must be taken in extrapolating to Zambia.

While it is unlikely that in the near term solar will constitute a major share of rural electrification efforts, it does lend itself to high net economic benefit activities where lower cost or lower quality energy resources are not available or applicable.

Perhaps a more realistic approach for rural Zambia will be through the use of solar lanterns. Solar lanterns usually charge in a few number of hours and can be used to power not only light but other small appliances such as a radio. These are the major initial uses in low income rural areas. They are less costly than standard home PV systems and are mobile.

### **c. Micro/Mini Hydro Systems**

Zambia has a number of potential sites on smaller rivers suitable for local small-scale power generation. The most advantageous places for such development are in the North-Western and the Northern parts of the country, because of the topography of the terrain, the geology of the ground, the highest rainfall figures in the country and the lowest evaporation due to below average.

The Zambian climate is characterized by the cycle of dry and wet seasons. During the dry season from April to November many small rivers dry up, whereas during the rainy period the rivers flood. Large variations in river discharges are thus typical of Zambian rivers.

Suitable sites have been identified by collecting information on rivers with sufficient year-round flows. Preference has been given to sites that can sustain run-of-river schemes since the regulation of river flows by dams and water storage requires high

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<sup>7</sup> Solar Electric Light Fund. [http://www.self.org/shs\\_role.asp](http://www.self.org/shs_role.asp); Benefits of solar

initial costs and makes small-scale hydropower projects uneconomical. Apart from the low cost, other benefits of run-of-river schemes include, fast and easy construction, easy flood protection, minimal environmental impact and low evaporation losses.

Although substantial information has been collected relating to the large scale and small hydro potential in Zambia, little information is available on the mini/micro hydro potential in the country. It is imperative that resource assessment studies be undertaken to prioritize and direct rural electrification activities and to promote private sector investment.

A successful example of micro-hydro exists at the 2.5 kWp Mutanda site. The plant supplies a community of 82 households and a maize mill. Total out of pocket capital costs were US\$37,500 with the community supplying labor for civil works. Annual operating costs average \$3,500 and revenues are around \$5,200. Revenues are comprised of tariffs (\$1.05 per household) of \$780 and use of the mill at around \$4,400 per year. The key salient points of this project are:

- First, the income of the community is high relative to the average rural community. Income averaged \$80 per month compared to \$33 for the average Zambian household.
- Second, the bulk of the revenues come from an economic activity, not household sales.
- Third, despite the community's higher income, subsidies were required.
- Fourth, the community was willing to reduce the cost by contributing labor.

Additionally, there are several important lessons to be drawn from this experience and which have been demonstrated in other countries as well.

- Target higher income communities first
- Require in kind contribution and make it a tool in selecting projects
- Organize the project around an economic activity
- Rank projects based on net economic benefit

Recently ZESCO has expanded into this project's service area. It is not known to what extent ZESCO is subsidizing service. Service should be provided by the lowest cost provider. However, if Zambia is to promote private investment in rural energy services, then it will have to take steps to provide security for investment through some form of concession. If private investors can be challenged by subsidized state resources once their investments have been made, then this source of funding will dry up.

#### **d. Current Biomass Situation**

There are an estimated 50 million hectares of woodland in Zambia. This is equivalent to 66% of the total land area. The standby volume of timber is estimated to be approximately 2.7 to 4.7 billion metric tons. Annual increments (yield) vary according to the region – higher in the North to lower in the South – and range from 0.3m<sup>3</sup>/ha to over

0.8m<sup>3</sup>. Wood fuel and charcoal meet the needs of about 70% of the rural and urban consumers.

According to 1995 statistics, the household sector consumed 115.5 PJ, representing 66% of the total energy consumption. One of the main problems in the biomass sector is degradation of woodlands and deforestation in certain parts of the country. Although some areas of the country have significant wood resources, there are also areas where the use of wood (for energy and other purposes) is unsustainable. In such areas, it has been estimated that the use of woods exceeds the annual increment (between 0.3m<sup>3</sup>/ha and 0.8m<sup>3</sup>/ha).

The enormous biomass resource in the form of agriculture, forest and municipal wastes could be used to supply energy in rural areas. While biomass holds potential, it is not without problems. There are enormous environmental problems such as land degradation as well as the attendant morbidity and mortality impacts for women and children who cook and heat with biomass. Large scale biomass utilization would require major changes in the planting, collection and harvesting so that costs and environmental impacts are minimized. These biomass resources can be used in generating electricity through:

- Direct combustion in boilers for steam turbines and engines
- Advanced combustion systems based on internal steam engines
- Condensing Extraction Steam Turbine
- Gasification systems

A potentially more effective strategy for Zambia is to focus on technologies which use biomass more efficiently, such as advanced wood stoves, and to use selected technologies, primarily biomass gasification and direct combustion in steam turbines, in areas where large quantities of waste exist, such as at mills.

#### **e. Wind**

Wind speeds in Zambia are relatively low. Wind data collected at 10 meters above the ground indicates speeds of between 0.1 to 3.5 meters per second (m/s) with an annual average of 2.5 m/s. These wind speeds are not particularly suitable for electricity generation, but are well suited for water pumping for household use and irrigation purposes. Despite this potential, only a few windmills have been installed in the country. Results from Chisamba by Conservation Farming Project indicate that windmills can be used for irrigation purposes of up to 2 Hectares.

In tests of treadle pumps (hand operated) small farmers were able to increase incomes between 600% and 800%. Irrigation allows them to: increase yields of existing crops during the traditional seasons; plant and increase production during dry season; and grow new crops. Incomes grow and risk is diversified owing to the introduction of new crops and planting/increasing yields in the dry season.

**f. Geothermal**

Zambia has more than eighty (80) hot springs. The Zambian hot springs are associated with zones of major deep seated fault and fracture systems along which water of mainly meteoric origin circulate to great depths and is heated through normal geothermal gradients. Most of the identified springs have not been examined in any great detail, but interpretations of geochemical data and estimation of subterranean temperature for some of them points to the existence of worthwhile and potentially exploitable low enthalpy geothermal reserves in most parts of the country.

Little else has been done to utilize the springs for industrial or energy provision purposes owing in large part to the cost. At present there is no geothermal generation. However, following an initiative with the Italian Government in the mid 1980's, Kapisya was developed to the extent that 2 x 120kW turbines were installed in 1987. Unfortunately the Kapisya installation is not operational.

**g. Cogeneration**

Cogeneration is usually one of the most economically and environmentally attractive methods of producing electricity. Significant potential exists in Zambia at extractive industries, sugar mills and forest products. These facilities are usually located in rural areas and use primary energy resources to produce heat and steam. The challenge for Zambia will be to develop a business model to exploit these untapped resources. Plant owners may be reluctant to undertake the investment for a variety of reasons such as: (1) concern over what it would do to their production; (2) inability to sell power; and, (3) lack of access to financial resources. This may require an ESCO type approach.

Additional work is required to assess the cogeneration potential, develop a business model and incorporate cogeneration into the Government's energy policy.

**5. Rural Poverty Reduction Interventions**

**a. Rural Electrification, GVEP and the PRSP**

There is recognition of the role of energy in reducing poverty throughout the Zambian PRSP. Some of the sectors explicitly recognize the need to develop and supply energy inputs to the sector. For example, agriculture identifies "provide electricity in high potential areas" and construct and rehabilitate rural dams and irrigation facilities" as key activities. The industrial sector recognizes the need to "encourage the rehabilitation and expansion of energy" for investment promotion and in rural industrialization "facilitating the provision of appropriate energy sources for small and medium-scale entrepreneurs, especially rural-based ones." Finally, the water and sanitation sector also recognizes that "small-scale hydropower generation targeting rural areas."

Recognizing that the PRSP and the programs that flow from it are dynamic, two key ways of mainstreaming GVEP and coordinating it with the PRSP are:

- The first idea is to include the head of the Ministry of Finance's Sector Advisory Group as the MoF representative on the committee. The Sector Advisory Group is one of the main PRSP bodies. This would insure a two-way flow of information on an ongoing basis and thereby keep the PRSP and GVEP current of each other's activities.
- The second idea is that through the pursuit of economic or productive uses of energy and their successful implementation, GVEP will be in the vanguard of rural poverty reduction. By implementing the first idea, the lessons learned from the second will flow into PRSP. It has the potential to become a self-reinforcing mechanism.

### **b. Rural Interventions**

The provision of electricity to households can have profound welfare implications: children now have light for reading; women can work longer hours and use some of that time in income generating measures. While this increase in the quality of life is important, it must be recognized, that simply increasing quality of life in the short run is insufficient because it is unsustainable. Zambia does not have the economic means to provide energy for these reasons.

The implication of this realization is that Zambia should provide rural energy on the basis of increased economic activity not on the basis of quality of life changes. It means recognizing that people can be helped out of poverty through the targeted introduction of appropriate energy to productive uses. In a nutshell this assumes that the role of the Government is to help identify productive uses for energy, i.e., uses that will generate additional income and/or employment. These uses, not individual consumption, drive and will pay for the energy consumed. In this view productive uses of energy are sought out. Supply goes to the project, area or community with the highest net economic benefit from the introduction of energy. Energy chosen is the least cost method of supply.

The discussion thus far builds the case for specific intervention which must be tailored to local circumstances. The underlying principle is to build on economic activities and these fall in to two major areas.

## **6. Using Energy to Enhance Economic Activity**

The first of the two approaches focuses on using an energy project to enhance existing economic activity. This could be supplying energy to enhance economic activities such as building a micro-hydro plant to service an existing maize mill and the surrounding population or providing windmills to increase agricultural output. These interventions are most likely to be relatively small, on the order of less than \$75,000. In many cases, costs are much smaller when wind energy for water pumping is considered.

A combination of rapid rural appraisal from the REA and Participatory rural appraisal from local communities can be used to identify those areas where economic activity is



sufficiently large, incomes sufficiently high and water resources sufficient to justify a pre-feasibility study.

### ***What is Participatory rural appraisal?***<sup>8</sup>

*“Participatory rural appraisal (PRA) is a label given to a growing family of participatory approaches and methods that emphasize local knowledge and enable local people to make their own appraisal, analysis, and plans. PRA uses group animation and exercises to facilitate information sharing, analysis, and action among stakeholders. Although originally developed for use in rural areas, PRA has been employed successfully in a variety of settings. The purpose of PRA is to enable development practitioners, government officials, and local people to work together to plan context appropriate programs.*

*Participatory rural appraisal evolved from rapid rural appraisal—a set of informal techniques used by development practitioners in rural areas to collect and analyze data. Rapid rural appraisal developed in the 1970s and 1980s in response to the perceived problems of outsiders missing or miscommunicating with local people in the context of development work. In PRA, data collection and analysis are undertaken by local people, with outsiders facilitating rather than controlling. PRA is an approach for shared learning between local people and outsiders, but the term is somewhat misleading. PRA techniques are equally applicable in urban settings and are not limited to assessment only. The same approach can be employed at every stage of the project cycle and in country economic and sector work.*

### **Key Tenets of PRA**

- *Participation.* Local people's input into PRA activities is essential to its value as a research and planning method and as a means for diffusing the participatory approach to development.
- *Teamwork.* To the extent that the validity of PRA data relies on informal interaction and brainstorming among those involved, it is best done by a team that includes local people with perspective and knowledge of the area's conditions, traditions, and social structure and either nationals or expatriates with a complementary mix of disciplinary backgrounds and experience. A well balanced team will represent the diversity of socioeconomic, cultural, gender, and generational perspectives.
- *Flexibility.* PRA does not provide blueprints for its practitioners. The combination of techniques that is appropriate in a particular development context will be determined by such variables as the size and skill mix of the PRA team, the time and resources available, and the topic and location of the work.

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<sup>8</sup> Source: World Bank Participation Source Book, Appendix I, Methods and Tools.

- *Optimal ignorance. To be efficient in terms of both time and money, PRA work intends to gather just enough information to make the necessary recommendations and decisions.*
- *Triangulation. PRA works with qualitative data. To ensure that information is valid and reliable, PRA teams follow the rule of thumb that at least three sources must be consulted or techniques must be used to investigate the same topics. “*

REA or their consultants would conduct the resource assessment work while local communities carried out the survey of economic activity and ability to pay along with other socio-economic data that would be needed to prioritize possible interventions.

## **7. Using Existing Economic Activities to Co-generate Surplus Energy**

These types of interventions build on industrial and agro-processing activities that use primary energy to generate heat or steam. Because they are already burning a fuel, the incremental cost of generating electricity is usually quite small compared to stand alone generation. Moreover, there are other economic and environmental reasons to prefer cogeneration. Facilities are often in off-grid rural areas. They are fewer in number, larger and require more professional expertise to assess. In Zambia examples include:

- sugar mills
- agricultural processing
- lumber mills
- mines
- refineries
- refractories
- cement plants

Sector specialists will be required to prioritize these interventions based on some heuristics and site visits.

## **8. Moving Forward**

Together, all these factors present a daunting challenge and guidance for Zambia's energy policy. Given incomes in rural areas, it is unlikely that electricity can be supplied without subsidy. Since the need far exceeds the resources available from the Government, this helps to establish a few rules.

- First, choose those projects that require the least amount of subsidy per person served.
- Second, not all subsidies are the same. Choose the subsidy that is least intrusive in market decision process. No subsidization of operating costs.
- Third, since the Government does not have sufficient resources to address the problem, it must ALSO rely on the private sector for resources: capital, management, and implementation.

The following guidance will help to insure least cost and lowest subsidy:

1. **COMPETITION:** The GRZ should introduce competition at all levels. There should be competition for projects and competition for funds. There should be no pre-established allocation which will allow all communities, all provinces and all parties to compete on the basis of merit for available funds. Competition will lower costs, reduce political involvement and spur innovation.
2. **DECENTRALIZED DECISION MAKING:** To promote local involvement and contribution, increase the use of local knowledge and help to insure appropriate technology choice, decision-making should be devolved away from the center to Provincial Governments and local communities. Provincial Governments could identify the needs, prioritize projects and identify solutions, and participate in the allocation of funds. Local communities are involved by giving preference to projects organized by communities and giving preference to projects where communities contribute in kind services. The REA and/or DoE would provide: tools and methodologies to evaluated projects, the methodology for prioritizing projects and allocating funds, the financial resources for the projects and technical assistance in project review. It would help by coordinating the institutions involved.
3. **JOINT FINANCING:** To increase resolve to work together and to help insure sustainability, preference would be given to jointly financed projects between the Government and investors. Investors, in this case, could be communities, individuals or companies. Government would contribute some or all of the capital costs and investors would contribute in the investment phase in either financial resources or in kind contribution to construction and in the operating phase. Government would not own or operate any of these facilities.
4. **APPROPRIATE TECHNOLOGIES:** Government will evaluate and recommend technologies on the basis of a number of relevant criteria, including, Minimum Life Cycle Cost and Highest Economic Impact. This will assist investors by reducing the risk and transaction cost for any single product. This will also reduce the cost of project evaluation from the Government's side.
5. **AVOID INSTITUTIONAL DRAG:** To avoid creating a drag on rural energy programs by increasing costs or reducing recovery the possibility of creating new institutions or increasing demands on current institutions should be avoided. For example, it has been proven time and again that it is better to channel investment funds through existing financial institutions than to create new ones that do not have the experience in project analysis, loan recovery and, more importantly, ties to the local community.
6. **SUBSIDIES:** Subsidies, as a function of their design, distort decision making. The key to using subsidies is to design them so that they: reach the intended audience; bring about the desired change; distort other economic decisions as little as possible; and, cost as little as possible. While simple sounding, it has

proven difficult in practice.

The main aspects that policy makers should focus on when choosing the subsidy are:

- **Transparency:** The financial costs and financial channels which the subsidy flow through should be completely transparent. All costs and all records should be open to the public.
- **Targeted:** The subsidy should be designed in such as way that only the intended beneficiaries receive the subsidy.
- **Benefit-Based:** The subsidy should be based on the positive benefits of the subsidized activity.
- **Practical:** The subsidy and subsidy mechanism should be practical and cost-effective to implement, monitor and evaluate.

Given the situation in Zambia, the best design for rural electrification subsidies may be one that impacts capital costs not operating costs; is not indefinite; and is coupled with a mechanism to recover capital replacement costs. In short, the best approach for Zambia may be in subsidizing the construction and/or equipment costs for rural electrification but that the costs to run, maintain and eventually pay for replacement of worn-out equipment is best shouldered by those that use the energy. It is preferable that subsidies not drive technology choice. Rather, technology choice should be based on the economics of the project without subsidy, thus enabling the best choice for local circumstances.

## **ANNEX VII: GVEP ENERGY AND POVERTY REDUCTION PUBLIC AWARENESS CAMPAIGN IN ZAMBIA**

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## **I. Introduction**

### **1. Objectives of the Global Village Energy Partnership (GVEP) Initiative**

Enhancing energy service delivery for poverty alleviation and sustainable development is one of the Government of the Republic of Zambia's (GRZ) highest priorities. In Zambia over 70% of the population is described as poor. Most of these people depend strongly on traditional fuels to meet their daily energy needs and access to affordable electricity and modern sources of energy remains a developmental challenge. Lack of financial resources is a major obstacle to most of the Zambians for accessing alternative energy sources.

GRZ and other local stakeholders recognize the need for a better integration of energy services in the country's rural development plans and programs. This is expected to enhance focus on income generation and employment activities, as well as on priority social interventions (in the areas of health, education, and clean water supply). The GVEP initiative falls well in line with the GRZ's Poverty Reduction Strategy Paper (PRSP) and the National Development Plan whose priorities include improved access of modern energy services to Zambian citizens.

The key objectives for Zambia on the GVEP involvement are as follows:

- to formalize and institutionalize in-country 'movement' on GVEP by facilitating the establishment of adequate structures for outreaching stakeholders throughout the country
- to organize/facilitate stakeholder meetings and initiate in-country consultations amongst stakeholders on the GVEP
- to integrate GVEP in the country policy framework, especially the Poverty Reduction Strategy Program (PRSP) and the National Development Plan
- to develop a GVEP National Action Plan that could be presented to donors and other stakeholders for follow up support

There is a widespread consensus among stakeholders in Zambia on the need to fulfill these objectives in order to embark on the implementation of a large energy service delivery program that would be widely and substantially co-funded by the GRZ, donor community, private sector, and consumers.

Although Zambia is well endowed with indigenous energy resources, the availability of modern energy services to the country's population of about 10 million inhabitants remains an important priority. While wood, petroleum, and large hydropower will continue to be the major energy sources in Zambia, at least in the mid term, efforts are being made to develop and expand other energy sources such as solar and mini-hydro.

Despite creative approaches on the policy front, the challenge of taking power to rural areas still remains formidable given the relatively high capital costs and low financial returns in rural areas. The actual cost of extending the power grid to remote areas in Zambia (same as in many other developing countries) is very high and the load demand for most rural areas is very low. The cost of the grid extension projects cannot be justified even from the social perspective. Given these constraints, success in electrifying large parts of the population through conventional grid-based services would not be attained for a long time. Therefore, the use of renewable energy technologies (RETs) in stand-alone or mini-grid systems represents a promising option for reaching out large sections of rural communities in Zambia. Energy Services Companies (ESCOs) are being tested in Zambia. The Ministry of Energy and Water Development has also incorporated the installation of photovoltaic (PV) solar systems in its rural electrification program. Certain parts of the country have already started benefiting from the installation of PV systems for water pumping, medical refrigeration, and lighting under the rural electrification program.

Barriers to achieving an enhanced electrification program and improved Modern Energy Service Delivery (MESD) systems include financial, institutional, and commercial. In addition, education, transaction costs, tariffs, training, and awareness on renewable energy technologies pose significant hurdles that must be overcome. In relative terms, RETs and small-scale energy systems have high investment capital costs, which need guarantees of long-term stable income streams to ensure financial viability. Fiscal incentives and some form of smart subsidy would enable the development of renewable energy projects and make them financially attractive to private participation.

## **2. Objectives and Strategy of the GVEP Public Awareness Program (PAP)**

The GVEP Public Awareness Program (PAP) has specific objectives which include the following:

- educate and sensitize media on energy issues through workshops
- identify channels of dissemination
- utilize outreach to include excluded or under represented populations
- simplify materials to disseminate to the general public
- involve local stakeholders: inform chiefs and headmen especially
- prepare TOR's for consultancy work

These objectives translate effectively into some of the principles which should guide the development and implementation of the GVEP PAP:

- The success of GVEP lies first in understanding the needs of the GVEP constituency and that the basis for successful communication is a two way street.
- Formal and informal systems should be developed for listening to various audiences.

- Remember that just because you heard it, does not mean you understood it. Rural peoples often express themselves using languages and manners that may not be familiar to policy makers. Make sure that the intent of the message is understood through confirmation of understanding.
- Information should be factual, clear, and neutral as well as positive. Zambians, even if uneducated, are intelligent people and therefore are skeptical of someone trying to sell them an idea.
- Model the PAP along successful commercial marketing techniques and approaches that have worked in rural Zambia.
- Test communication strategies and products to judge success and refine as necessary.
- Build a broad consensus of the importance of GVEP and the efforts of the GVEP Working Group.
- Confront misconceptions head on and be responsive to questions.

### **3. Obstacles and Opportunities**

Several of the key challenges to a successful PAP in Zambia include the following: financial limitations, communication barriers, state of the economy, the information disclosure differences between current institutions, and the shifting demographics of Zambian society. While these challenges are not insurmountable they are formidable and must be taken into consideration to ensure short and long term success in public awareness campaigns.

There are significant barriers to communications in Zambia, notably the absence of nationwide inclusive media networks and information sources. Many information networks are informal or consist of older and sometimes inaccurate information, being communicated to a larger population through word-of-mouth. There is no single media source that can be used to communicate to reach most of the Zambian public.

The state of the Zambian economy, while stable, is weak. Zambia's external debt of \$5.8 billion is almost five times its annual budget revenues. Over 80% of the population lives on less than \$2 USD a day.<sup>9</sup> External debt servicing, coupled with aid payments, place a significant strain upon the Zambian economy which relies heavily on raw materials and does not have established and stable methods of creating and transporting finished goods.

While the 3-4% growth of the Zambian economy is stable, it is not within the higher measures, detailed in Zambia's PRSP that would transform the economy. Despite the actual and anticipated increases in Zambian agricultural export brought on by

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<sup>9</sup> [www.nationmaster.com](http://www.nationmaster.com), compilation of Zambian statistics.



neighboring Zimbabwe's food shortage, it is likely that without the development of rural energy income generation and maintenance will remain at the subsistence level.

The state of the Zambian economy directly leads into the fact that Zambians, given their financial limitations, are unable to pay for modern energy sources. This gives rise to the issue that energy transforms economic potential into economic reality through its ability to increase economic prospects by improving standards of living as well as increasing the viability of Zambian products in the local, national and regional marketplaces.

The shifting demographic of Zambian society is becoming increasingly relevant to its ability to absorb developmental assistance and create opportunities for its own progression in the short term and the long term. According to UN estimates Zambia is currently ranked number 1 in the world for the probability of not reaching the age of 40 with 53.6% of Zambians not hitting this milestone.<sup>10</sup> This significantly diminishes the ability of Zambia to build up and retain human capital for future generations.

Thus, any public awareness program include considerable information concerning how energy can be utilized to prolong life through its applications in developing economic opportunity, providing health care, and additional education. By including the cross-sectoral issues that inevitably rise from the use of modern energy the importance of modern energy sources will become a higher priority for the general public of Zambia, not simply the urban public of Zambia.

In addition, public messages should be tailored for a younger demographic to ensure that a majority of the Zambian population is being reached.

Another obstacle for the implementation of the GVEP PAP is the difference in information disclosure styles of the various institutions currently involved in the energy sector. While some stakeholders, such as the rural farmer and the REA, either have no mechanism for dissemination of information publicly, or are unable to so given their resources; others, such as the ERB and ZESCO, make regular informational disclosures. It is the style of disclosures that merits attention.

There is no coordination of information release in the Zambian energy sector. For example, in January 2005, despite the reassurance and statements by the ERB that electricity tariffs would increase by 5.3%, ZESCO chose to announce that they would be raising those tariffs by 15%, effective on April 1<sup>st</sup> of 2005.<sup>11</sup> While the manner of the ZESCO announcement contained explanations and justifications for the significant rate increase, the conflicting messages that the public received concerning the price of energy did not present a clear or unified picture of the energy sector to the average consumer.

Despite these drastic obstacles there are solid opportunities for increasing the success of the Zambian PAP. Zambia has high rates of literacy with rates of 85.7 for the male

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<sup>10</sup> United Nations Statistics 2001, courtesy of nationmaster.com.

<sup>11</sup> "ZESCO Boss Justifies Proposed Tariffs Hike", Times of Zambia, January 12, 2005.

population and 72.6 for the female population.<sup>12</sup> Given that most Zambians are able to read to some degree, using written mediums would be a useful way to communicate the GVEP message to a broad segment of the population.

Zambia, relative to other African nations, is incredibly stable in the political realm as well as in its developing civil society.

In addition, Zambia produces much more electricity than it actually requires, exporting 1.75 billion kWh annually.<sup>13</sup>

Another opportunity which the GVEP PAP poses to Zambia is that it will set a standard for the coordinated release and dissemination of information in a developing countries' energy sector. If the Zambian GVEP PAP can successfully target rural populations by identifying, developing and educating their energy requirements and abilities it may serve as a best practices model for other countries who participate in GVEP. This will not only bring additional attention to the Zambian energy sector but also to the positive successes which can result from transforming areas previously untouched by modern energy supplies.

Finally, the GVEP PAP provides the opportunity for the Zambian government to tangibly demonstrate its commitment to good governance practices, a key element of many international donors. In addition, the GVEP PAP furthers the Zambian PRSP goals of "setting up mechanism for the effective transfer of knowledge from experts ... to local experts"; "rationalizing the operations of state institutions responsible for collecting information pertinent to ... monitoring poverty"; and finally, "targeted interventions aimed at achieving particular results such as increased access and promotion of alternative technology".<sup>14</sup>

The GVEP Secretariat is uniquely posed to assist Zambian stakeholders in the PAP process by offering assistance with the organization of monthly meetings and community meetings; reporting on Zambian progress and success under the GVEP program; promoting news articles and other energy related information about Zambia domestically and abroad; assist with translations of materials into the local language as well as the official language; and finally, assist with developing the means, most likely through the internet, of communicating Zambia's progress within GVEP to the wider global public.

## **II. Phase I – Analysis and Strategy**

### **1. Overview of Energy and Development in Zambia**

In Zambia over 70% of the population is described as poor. Most of these people depend strongly on traditional fuels to meet their daily energy needs and access to affordable electricity and modern sources of energy remains a developmental challenge.

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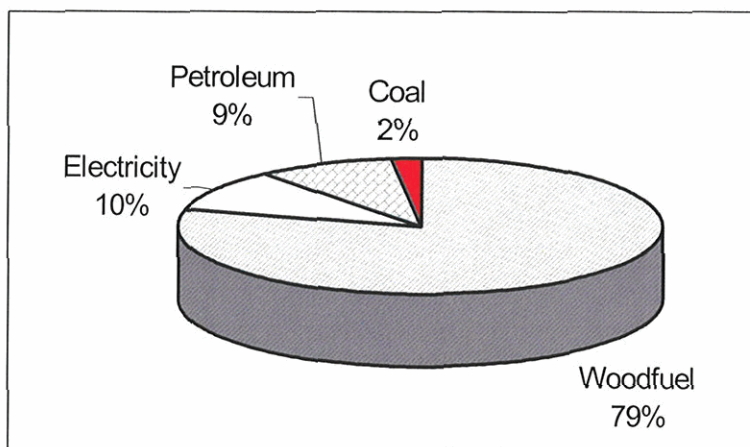
<sup>12</sup> Statistics derived from <http://www.thezambian.com/zambia/statistics.aspx>.

<sup>13</sup> CIA Factbook, Zambia Country Information.

<sup>14</sup> Zambia - Poverty Reduction Strategy Paper.

Traditional energy sources usually have lower efficiencies compared to conventional sources. This fact puts poor households in a disadvantaged situation, particularly in peri-urban areas as they spend more on each unit of energy obtained. A lack of financial resources is a major obstacle to accessing alternative energy sources. Among the present sources of energy, wood fuel in the form of charcoal and firewood contributes 79%, electricity 10%, petroleum products 9% and coal 2% of the total energy consumed. The energy use by product is depicted in the Exhibit 1.

**Exhibit 2: Energy use by product (Energy Bulletin 2000)**



The contribution of renewable sources of energy such as solar and wind to the overall national energy balance is currently negligible and, therefore, not included in the national energy statistics. The following summarizes the status and use of energy resources in Zambia.

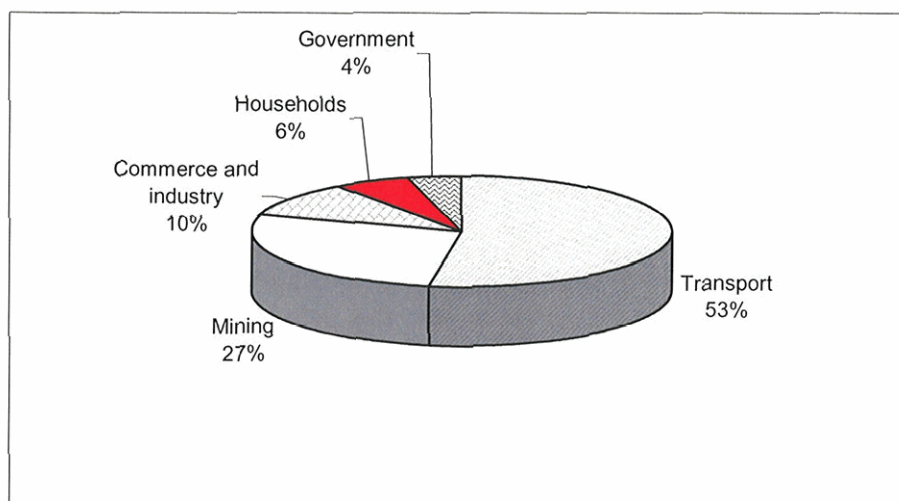
### **Wood Fuel**

Looking at the structure of energy consumption in Zambia, we find that it is dominated by traditional wood fuels (firewood and charcoal). The main sources of wood fuel are natural wood lands and agricultural lands. The present consumption of wood fuel exceeds the potential sustainable supply. Cutting live trees for fuel is common and is associated with the growth of urban wood fuel markets. With the current urbanization rate of approximately 1% of the total population, the rate of wood fuel consumption will obviously continue to go up. This can be perceived as a serious threat to the land cover which is currently estimated at 66% of the total land area.

### **Petroleum**

Zambia imports all its petroleum requirements which contribute 9% of the national energy demand. The import of petroleum dominates all other expenditures and forms a major part of Zambia's import bill. Established infrastructure for petroleum import and processing include the 1,704 km TAZAMA pipeline from the Dares-Salaam port in Tanzania to INDENI refinery in Ndola. The transport sector is the biggest consumer of the petroleum products followed by the mining industry as shown in the Exhibit 2.

### Exhibit 3: Petroleum consumption by sector (Energy Bulletin 2000)



#### Coal

Proven coal deposits are estimated at over 30 million tons while potential coal resources are estimated to be several thousand tons. All the coal in Zambia is currently mined at Maamba by the only coal company – Maamba Collieries Limited (MCL). The consumption of coal in Zambia is confined to the mining industry (54%), commerce and industry (37%), and the government and service sectors (9%). The contribution of coal to the total energy balance has been declining over the years due to operational constraints at Maamba Collieries.

#### Electricity

Electricity is the second most important indigenous energy source after wood fuel contributing 10 % to the national energy supply. The electricity sector is dominated by hydropower with an estimated potential of 4,000 MW. The total installed capacity is 1760 MW, of which 1670 MW is Hydropower and 90 MW thermal power as shown in Table 1.

**Table 1: Installed Electricity Generation Capacity (ZESCO Statistics)**

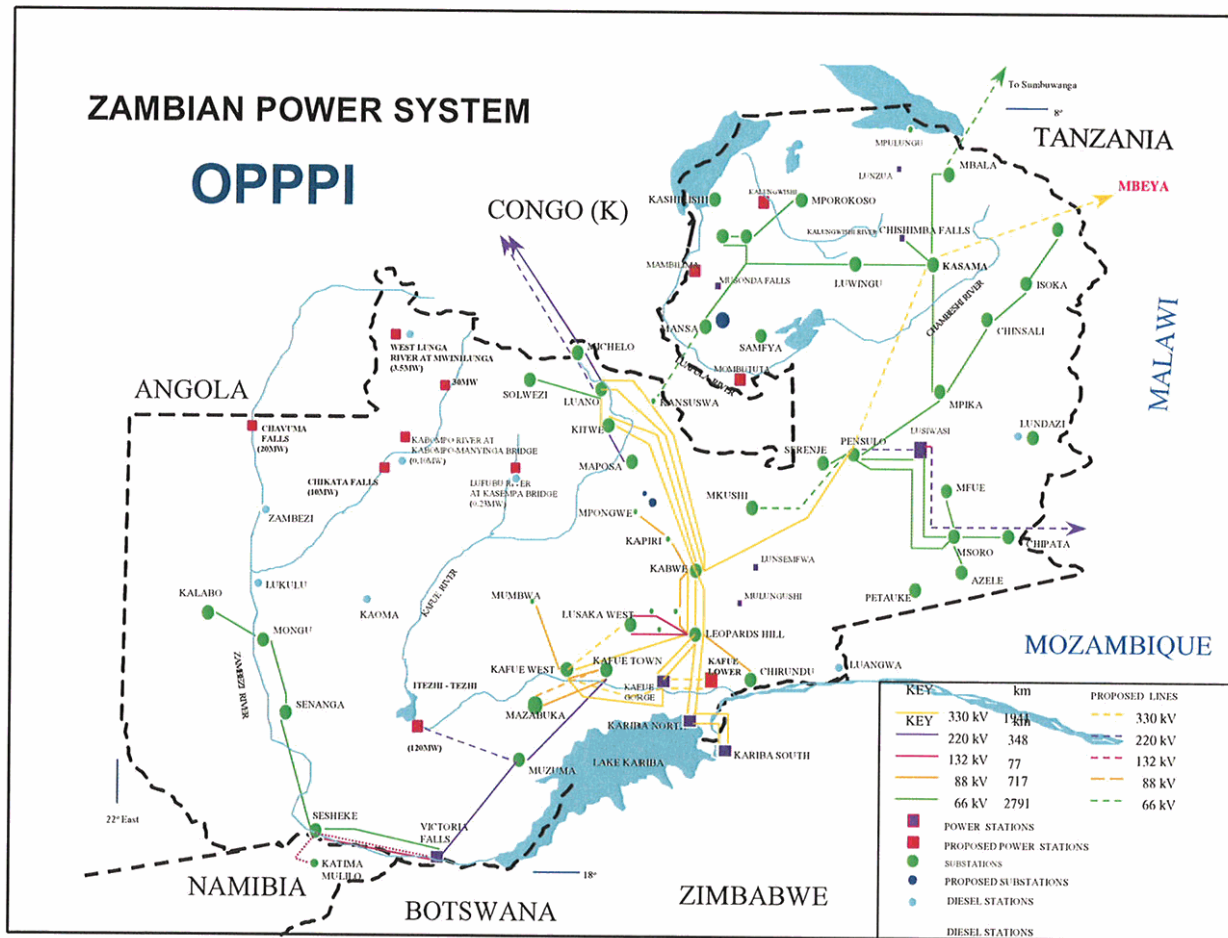
No.	Description	Capacity (MW)	Type
1	Kafue Gorge	900	Hydro
2	Kariba North Bank	600	Hydro
3	Victoria Falls	108	Hydro
4	Lunsemfwa & Mulungushi	38	Hydro
5	Small Hydros	24	Hydro
6	Isolated Generation	10	Diesel
7	Gas Turbine (stand by)	80	Gas
	<b>Total installed capacity</b>	<b>1760</b>	



The hydropower stations supply the grid while the diesel power generating plants supply isolated loads mainly in remote areas not connected to the grid. The Gas Turbines totaling 80 MW are located in the Copperbelt providing standby supply to the mines.

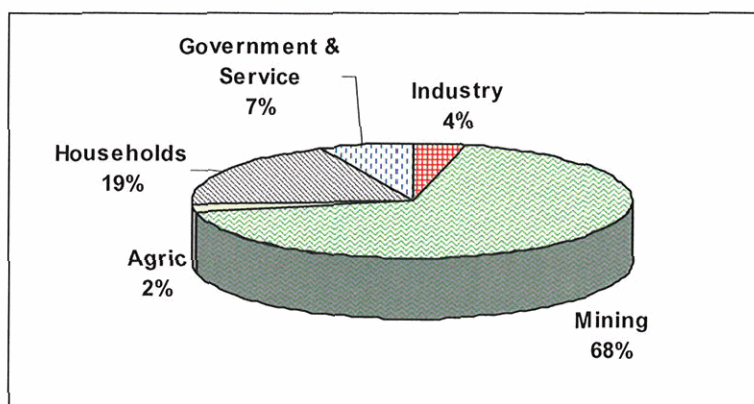
Zambian national power system, grid layout, and interconnections with other countries are shown in Exhibit 3.

**Exhibit 3: Zambian Power System, National Grid, and Interconnections**



The major electricity users are the mines, which constitute up to 68% of total load, industry and commerce (4%), households (19%), and agriculture and forestry 2%. The remaining 7% are taken up by government services. Exhibit 4 graphically depicts the share of each user group.

#### Exhibit 4: Electricity Consumption by User Group (Energy Bulletin 2000)



#### New and Renewable Sources of Energy

While wood, petroleum and hydropower will continue to be the major energy sources in Zambia, at least in the mid term, efforts are being made to develop and expand other energy sources such as solar, mini-hydro and wind. Zambia has a large potential for a variety of renewable energy resources. Table 2 summarizes the availability and potentials for the utilization of renewable energy sources and technologies.

**Table 2: Availability and Potentials for Utilization of Renewable of Energy Resources and Technologies in Zambia<sup>15</sup>**

Renewable Energy Source/Technology	Opportunities/Use	Resource Availability	Potential Energy Output
<b>PV</b>	Thermal, Electricity (water pumping, lighting, refrigeration)	6-8 sunshine hours	5.5 kWh/m <sup>2</sup> /day (modest potential especially for limited irrigation)
<b>Wind</b>	Electricity, Mechanical (water pumping)	Average 3m/s	Good potential, especially for irrigation)
<b>Grid extension</b>	Electricity	Existing infrastructure	Excess power (approx. 200 MW)
<b>Micro-hydro</b>		Reasonably extensive	Requires elaboration and quantification
<b>Biomass</b> (combustion and Gasification)	Electricity generation	Agro wastes Forest wastes Sawmill wastes	
<b>Biomass</b> (biomethanation)	Electricity generation Heating (cooking)	Animal waste Municipal and Industrial waste Waste water	Potential requires elaborates

<sup>15</sup> "Opportunities, Barriers and Policy Dialogue Process to Promote the Use of Renewable Energy Technologies (RETs) and Energy Efficiency for Sustainable Development With Particular Reference to Poverty Reduction", Prof. F. D. Yamba, Director, Centre for Energy, Environment and Engineering Zambia Ltd (CEEEZ), March 23, 2004.

<b>Biomass</b> (extraction, processing for transport)	Ethanol for blending with gasoline to replace lead as octane enhancer  Biodiesel for stationary engines	Sugarcane Sweet sorghum Jatropha	15,000 Ha to meet current demand 40,000 – 50,000 Ha
<b>Biomass</b> (for household energy)	Improved charcoal production  Improved biomass stove	Sawmill wastes and indigenous trees from sustainable forest management	Reasonably extensive

The estimated mini-hydro potential is about 45 MW and the country has, on average, 2600-3000 hours of sunshine per year. Wind energy regime in Zambia is relatively low. Wind data collected at 10 meters above the ground indicates speeds of between 0.1 to 3.5 meters per second with an annual average of 2.5 m/s. These wind speeds are not particularly suitable for electricity generation, but are well suited for water pumping for household use and irrigation purposes.

The development of solar energy and mini-hydro potential can play a major role in increasing the supply of electricity to rural areas. Recently, the Ministry of Energy and Water Development (MEWD) and the Swedish International Development Agency (SIDA) have implemented a pilot solar photovoltaic (PV) project in the Eastern Province of Zambia. The project provides PV electricity services to rural areas through the newly formed rural-based Energy Service Companies (ESCOs). Currently, a project under UNIDO/GEF on Renewable Energy Based Electricity Generation for Isolated Mini-grids in Zambia involving solar energy, biomass and mini-hydro units is being implemented. The success of the existing initiatives for promoting the use of renewable sources of energy will eventually lead to a significant contribution of these sources to the overall national energy balance.

## 2. GRZ Rural Energy Policy

The GRZ has made significant strides in rural energy policy through the establishment of the Rural Electrification Authority (REA). The REA's mandate specifically takes into account that "previous efforts to electrify rural areas have been ineffective".<sup>16</sup> In order to rectify this, the REA has stated that "a critical factor for efficiency and sustainability will be the involvement of local communities at all stages of development".<sup>17</sup>

## 3. Energy and Poverty Reduction Strategy Paper (PRSP)

Zambia's Poverty Reduction Strategy Paper (PRSP) covering the 2002-2004 period highlights a multi-pronged approach to reducing poverty. The country recognizes that economic growth is a key element in poverty reduction and, as a result, growth stimulating interventions are being vigorously pursued by government. In the energy

<sup>16</sup> Rural Electrification Authority for Zambia: Formation, Mandate and Governance.

<sup>17</sup> Rural Electrification Authority for Zambia: Formation, Mandate and Governance.

sector, the PRSP recognizes the availability and provision of modern energy services as a catalyst for economic growth, poverty reduction and environmental protection. Increased accessibility of the majority of the population to efficient modern energy services will lead to the improvement of the standard of living of the Zambian people. Apart from being a critical input in many sectors, energy is an industry with the capacity of earning foreign exchange and providing employment to many people.

One of the key drivers within Zambia' PRSP is increasing the current rate of economic growth. This can be spurred on quickly through the incorporation of energy as an income generating mechanism rather than as a measure of how electrified the society is.

#### **4. Identifying Audiences and Stakeholders**

This section presents a general identification of audiences and stakeholders whose participation in GVEP should be engaged through an integrated public awareness program. This identification was based upon three factors: stakeholder meetings that have been held, discussion with other groups, and on past experience. The primary audiences and stakeholders are:

- Farmers
- Rural based SMEs and Industry
- Energy Companies and Potential Investors
- Churches and Religious Bodies
- Press and Media
- Financial Institutions
- General Public
- Ministries and Government Agencies
- Non-governmental Organizations
- Politicians and Decision Makers
- Municipalities
- Donor Organizations

For the purposes of the PAP, these 12 groups can be aggregated into fewer groups based on the information GVEP will seek to learn and impart, the role these groups will play and the media use to communicate with them. It will help to focus and reduce costs.

1. Energy Users and Suppliers
  - a. Farmers
  - b. Rural Based SMEs and Industry
  - c. Municipalities
  - d. Energy Companies and Potential Investors
2. GVEP Facilitators
  - a. Churches and Religious Bodies
  - b. Financial Institutions



- c. Press and Media
- d. Ministries and Government Agencies
- e. Non-governmental Organizations
- f. Politicians and Decision Makers
- g. Donor Organizations

### 3. General Public

The first grouping, Energy Users and Suppliers, are those that demand energy and those that have the potential to supply it. The second grouping includes those that will facilitate GVEP. Churches and religious bodies, for example, can provide effective community organization and, in some cases, even raise funds and manage community based energy systems. The third group, the general public, has a need to know and can be helpful from time-to-time but are not generally engaged in GVEP.

## 5. GVEP Target Groups

The following list provides various features about the three target groups that need to be identified. While much is known about the characteristics of some of the subgroups of audiences, additional information will need to be gathered before embarking on a full PAP.

### 1. Energy Users and Suppliers

#### a. Farmers

- Size
- Educated vs. non-educated
- Own, lease or traditional land system
- Male or Female
- Area of Country
- Availability of other infrastructure
- Need for irrigation

#### b. Rural based SMEs and Industry

- Size
- Current source of energy
- Access to credit & markets
- Male or female ownership
- Potential for cogeneration

#### c. Municipalities

- Size
- Distance from the grid
- Economic activity
- Income

#### d. Energy Companies and Potential Investors

- Access to credit & markets
- Potential for cogeneration
- Tariffs

- Familiarity with rural customers

## **2. GVEP Facilitators**

### **a. Churches and Religious Bodies**

- Experience with community based programs
- Sister relationship with foreign churches

### **b. Financial Institutions**

- Familiarity with micro credit and/or energy
- Current operations in rural communities
- Transaction cost and mandate

### **c. Press and Media**

- Newspapers
- Magazines
- Radio
- Television

## **6. Stakeholder Perceptions**

There is a critical information gap regarding stakeholder perceptions in Zambia. While the views of some sectors have been solicited and explored, such as government, non-governmental organizations and some private organizations, it is imperative that information be gathered from critical stakeholders such as small-scale farmers and rural business owners.

It is impossible to speculate upon the opinions and perceptions of certain stakeholders who do not have access to media or government. Stratified sampling of targeted groups, such as rural business people and small-scale farmers, would be the most cost effective and efficient manner of establishing perception baselines for stakeholder groups who are currently under or unrepresented. This would ensure that public awareness is targeted at previously excluded segments of the population while minimizing the resources required to commit to such an undertaking.

Given that previous attempts to electrify rural areas were unsuccessful, it is imperative that the rural public understand why previous attempts were not productive and why future efforts to provide energy (not necessarily on-grid electricity) may be more successful. It is also important to communicate to the Zambian public why the energy surplus of almost two billion kWh annually cannot be easily consumed in-country.

It is essential to determine how stakeholders perceive the information that they have been given or that they have acquired. Have they acquired a majority of their information from the government? Word of mouth? Community myths? Is this information accurate? Is it influenced by cultural standards? The goal of the GVEP PAP is to ensure that the public awareness translates into more educated consumers.

## **7. Review of Incentives and Disincentives**

One of the major incentives in Zambia is that local stakeholder groups are becoming increasingly aware that without modern energy services it will be impossible to improve

the economic and social life of the Zambian population in a sustainable and viable manner. This basic awareness of the impact of modern energy services on daily life is essential to the general population acquiring the ability to become educated consumers as well as active participants in the energy sector. The willingness and cooperation of NGOs and other local stakeholder groups to participate in the GVEP PAP is a definite incentive for increased success.

The REA, compared to its more established counterpart the ERB, is very new and has not yet developed the full institutional mission and its role in participating in the Zambian energy sector. Incorporating the GVEP PAP into the institutional mission and action of the REA would provide the new institution with greater response and flexible abilities in regards to assisting the rural public as well as defining its own mission.

Another significant incentive for the success of the GVEP PAP is that it presents Zambia with the opportunity to 'leap frog' technologically by skipping traditional infrastructure development in favor of renewable and non-grid methods of energy production and consumption.

A major disincentive with the GVEP PAP is that the government and other relevant energy stakeholders, such as the ERB and ZESCO, may be unable to fulfill an educated public's expectations and demands.

## **8. Modes of Outreach (Dissemination)**

Given that it is imperative that the broadest group of stakeholders be reached. Thus, it is a natural conclusion that a wide variety of communication tools be utilized in order to reach and communicate effectively to the largest possible audience.

Education is critical in order to satisfy Zambia's developing energy sector, especially in rural areas. The public requires clear and precise information concerning the energy options that will most benefit them in terms of developing economic opportunity as well as why their energy demands may be met with methods other than traditional grid extension.

The most relevant modes of outreach in Zambia are community meetings, print media and radio. Television may also be considered but given that local programming is limited to one station and is only available to the wealthy segment of the population it will not have any realistically noticeable impact upon overall public awareness.

## **III. Phase II – Design and Production**

### **1. Developing a Pilot Program**

The development of a pilot program is essential to determining the methods that will best suit information dissemination to the Zambian public. If the broadest spectrum of energy stakeholders is engaged in the design and implementation of the pilot program,

ideas and information can be completely inclusive of the Zambian energy sector's current status and goals.

The stratified sampling, mentioned above, can serve as a key tool to define areas or groups of individuals who would be most responsive to being the subjects of the pilot program. A pilot program would also work best in areas that have experienced some off-grid energy development, whether that is the result of governmental intervention or due to some non-governmental participation.

## **2. Print Media**

Energy constraints on a majority of Zambia's population render public outreach and participation a simple affair due to the technological constraints that the energy deficit places upon the population. Radio, television, and other such mediums are ineffective tools for reaching those in Zambia with the most to gain from potential energy advancements, namely rural farmers and business people.

The energy sector, particularly developments in electricity, is already covered to some extent in the major Zambian newspapers, notably the Times of Zambia. While this type of media is fairly accurate and informative it remains within newspaper distribution networks. These articles could be collected and condensed on a regular basis and then distributed in rural areas as energy news digests. This type of strategy would work to correct the imbalance of information available in urban and rural areas.

## **3. Broadcast Media**

According to the Africa ICT Policy Monitor there are 113 televisions for every 1,000 Zambians.<sup>18</sup> It is a safe assumption that these televisions are concentrated in the capital Lusaka as well as in resort areas and are unavailable to the general public as well as rural stakeholders. Zambia essentially has one local/national television outlet, the Zambian National Broadcasting Corporation (ZNBC-TV), whose broadcasts are dominated by religious and foreign programming.

While news and a weekly economics discussion are also broadcast on ZNBC-TV it is obvious that the bulk of Zambian television programming is intended for spiritual edification or for entertainment purposes. While it may be possible to develop an informational campaign that includes television it does not seem likely that, in Zambia, a television campaign would be well received through current available outlets or that it would impact a wide audience in terms of numbers and demographics.

## **4. Radio Spots**

According to the Africa ICT Policy Monitor there are 175 radios for every 1,000 people in Zambia.<sup>19</sup> Zambia has three public, four private and two religiously owned radio stations

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<sup>18</sup> [http://africa.rights.apc.org/index.shtml?apc=s21819e\\_1](http://africa.rights.apc.org/index.shtml?apc=s21819e_1).

<sup>19</sup> [http://africa.rights.apc.org/index.shtml?apc=s21819e\\_1](http://africa.rights.apc.org/index.shtml?apc=s21819e_1).

that provide programming.<sup>20</sup> Given that radios are less expensive than televisions, and can be operated with non-electrical power sources such as batteries, radio would provide a communications mechanism that would reach a wider audience than other types of modern technologies present in the country.

Given the greater amount of diversity present in radio mediums than in television mediums it would be possible to specifically tailor radio messages to the smaller audiences which listen to specific types of radio.

## **5. Seminars, Workshops, Town Hall Meetings and Church Meetings**

Reaching the broadest segment of the targeted population requires the use of methods that will provide the most comprehensive access and transparent input. Through the use of formal and informal seminars, workshops, town hall meetings and church meetings, certain segments of the society, especially those uncomfortable or unfamiliar with expressing themselves in a public venue, will have the opportunity to be included in the determination of baseline public awareness as well as have the chance to express their perceived energy needs.

Bringing communities together can also serve to assess small-scale aggregate energy needs. Sampling of individuals can reveal preferences for education but community participation is more likely to create a situation in which dialogue and needs can be assessed.

## **6. GVEP Newsletter and Other Publications**

Zambia is uniquely positioned to become a GVEP model country given its stance of embracing the ideals and goals of GVEP as well as its desire to utilize energy as a primary mechanism for lifting its people out of poverty. It is imperative to communicate Zambia's efforts with the GVEP Program to a wider audience. Zambia's progress under GVEP should be given high priority and attention as it stands to be a model for GVEP work in Africa as well as around the world.

Through the GVEP Newsletter, as well as other related publications, Zambia's progress can be viewed by other nations who wish to use energy as a poverty reduction mechanism. The successes, and failures, of the GVEP program in Zambia can serve as best practices for individuals, institutions and governments in other nations.

## **IV. Phase III – Implementation and Evaluation of the Program Success**

The success of the pilot program will assist Zambia in determining how to best shape and implement future public awareness and outreach campaigns. Accordingly, objective measurement of the pilot program, which includes how public understanding was increased in regards to energy, is critical. The basic guidance that should be followed in regards to monitoring and evaluating the success of the GVEP PAP follows.

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<sup>20</sup> [http://news.bbc.co.uk/1/hi/world/africa/country\\_profiles/1069294.stm](http://news.bbc.co.uk/1/hi/world/africa/country_profiles/1069294.stm).

The method of data collection is relevant to determining the usefulness and accuracy of the information gathered. The primary consideration is how data will be collected. There are two methods which would be effective in data collection for the GVEP PAP pilot program: stratified sampling (for separate consideration of classes as well as aggregate consideration) and multi-stage sampling (for nationwide assessment of pilot program affects).

Information sources and developers must be as objective as possible to ensure accuracy of results and the ability to apply data to future public awareness and education campaigns.

Performance indicators for the GVEP PAP must take into consideration the goals and objectives of GVEP, the REA, the GRZ as well as the overall goal of lifting Zambia out of poverty. The choice of performance indicators for the pilot program, as well as their corresponding definitions, are essential for determining the various impacts upon differing segments of the population. For example, given the demographics of the population being targeted by the Zambia GVEP PAP, it would be unwise to use 'awareness of electricity in homes' as a performance indicator. It would be more beneficial to use an indicator such as 'awareness of energy as an income generating tool'. This would ensure that the rural public is educated on the benefits of energy as a whole and not raise expectations of being included on the electricity grid. It would allow for greater public acceptance of off-grid and renewable technologies as well.

The interpretation of the data is also key in ensuring effective monitoring and evaluation. Performance indicators, as well as information solicited from the public, should be kept as straightforward and interpretation-free as possible. Data interpretation often incorporates bias and can skew results.

Using and communicating the performance of the GVEP PAP program in a transparent and direct way is a high priority. The Zambian public needs to build additional trust and faith in the energy sector and, in order to do so, must be given information in a manner that is truthful and not politically or financially motivated. Solicited and unsolicited feedback is essential if the pilot program is to serve as the basis for future ventures.

It is also important to note that individuals and groups being targeted by the GVEP PAP are primarily living at the subsistence level and, after participation in the pilot program, may or may not be inclined to devote more of their time to development of public awareness and education for a resource that is not yet readily available to them. This is why it is absolutely critical to effectively communicate the transforming qualities of energy to this population.

The GVEP PAP has great potential to benefit those populations underserved by the traditional energy regime in Zambia as well as catapult economic output and potential. By broadening the public view of energy and its potential to impact their lives and well being it will be possible to sustain a good governance regime in the Zambian energy sector.